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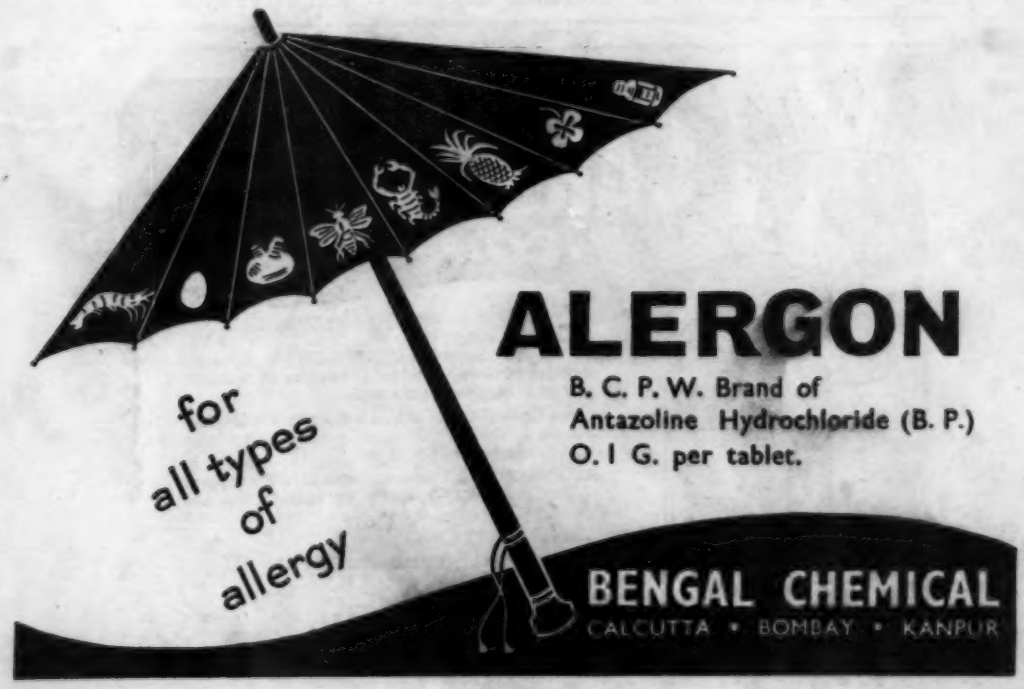

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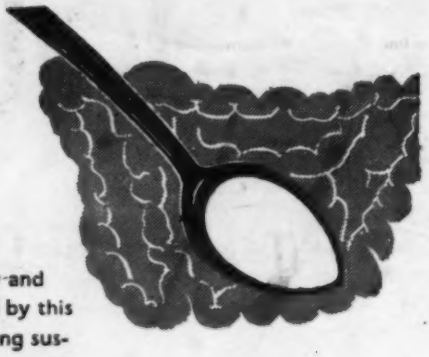

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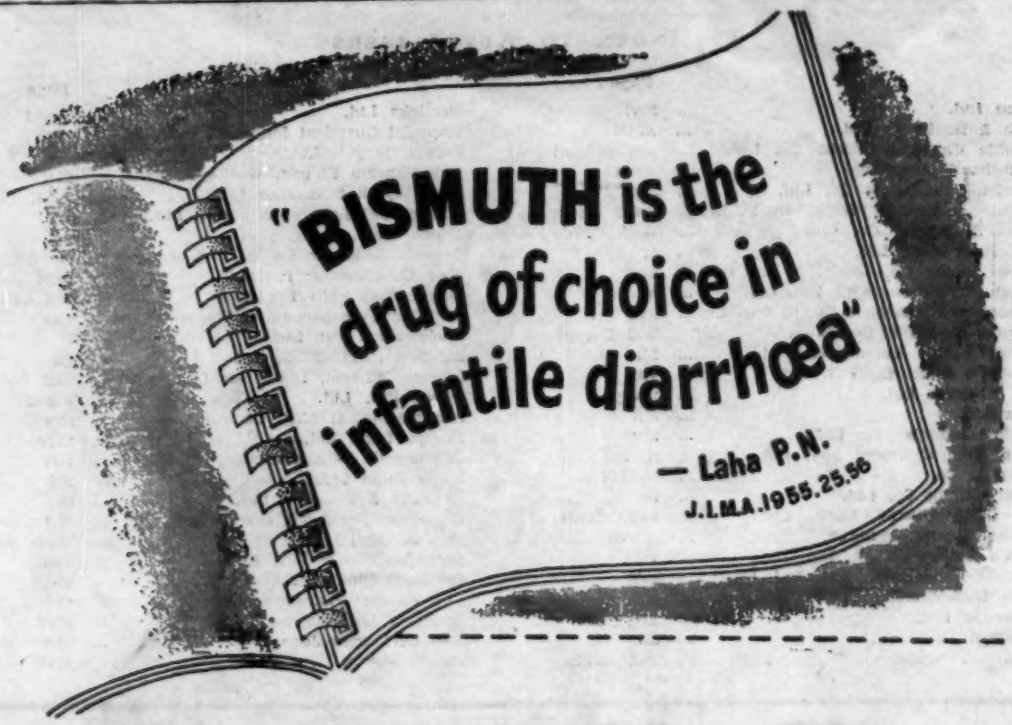

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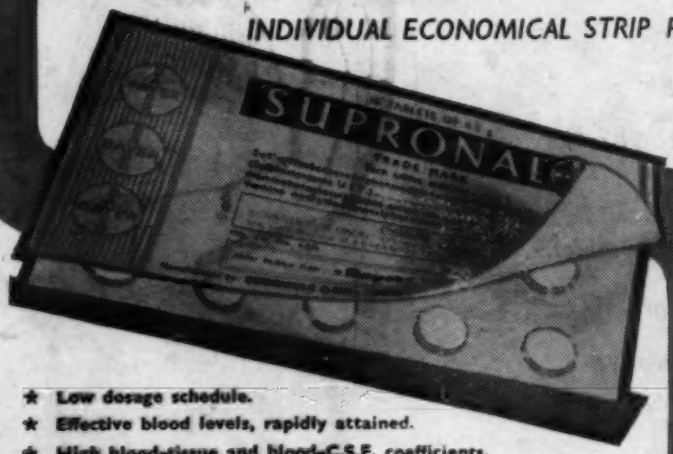

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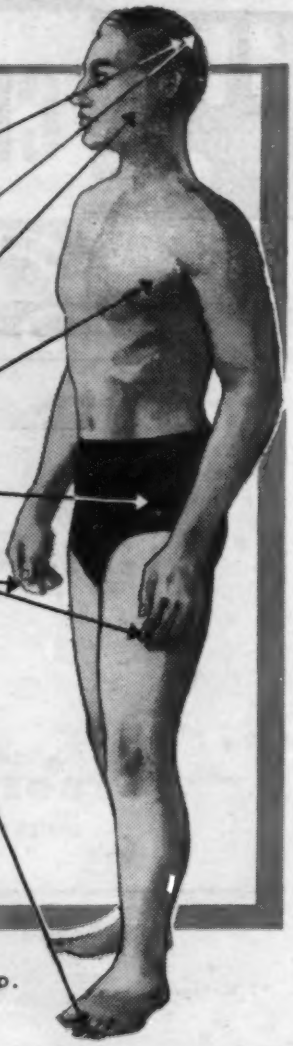

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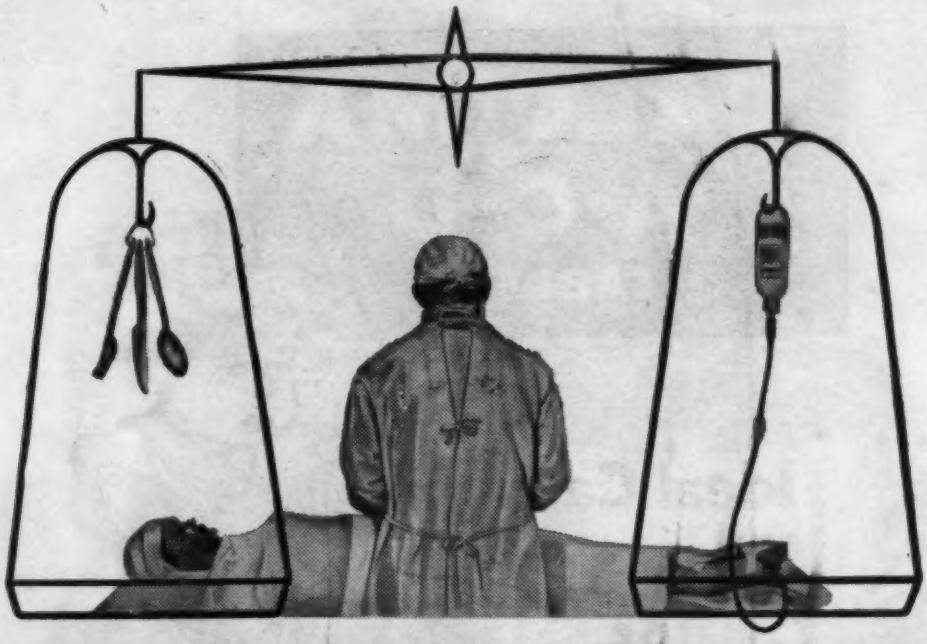

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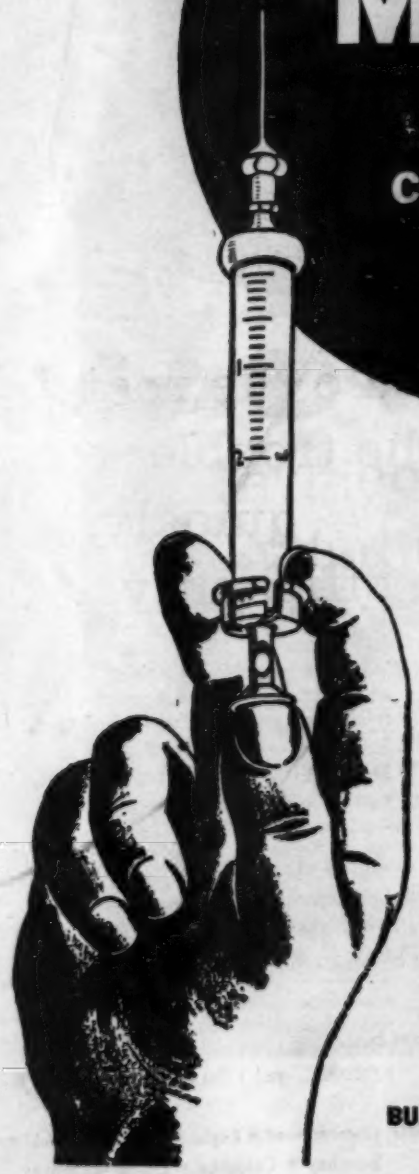

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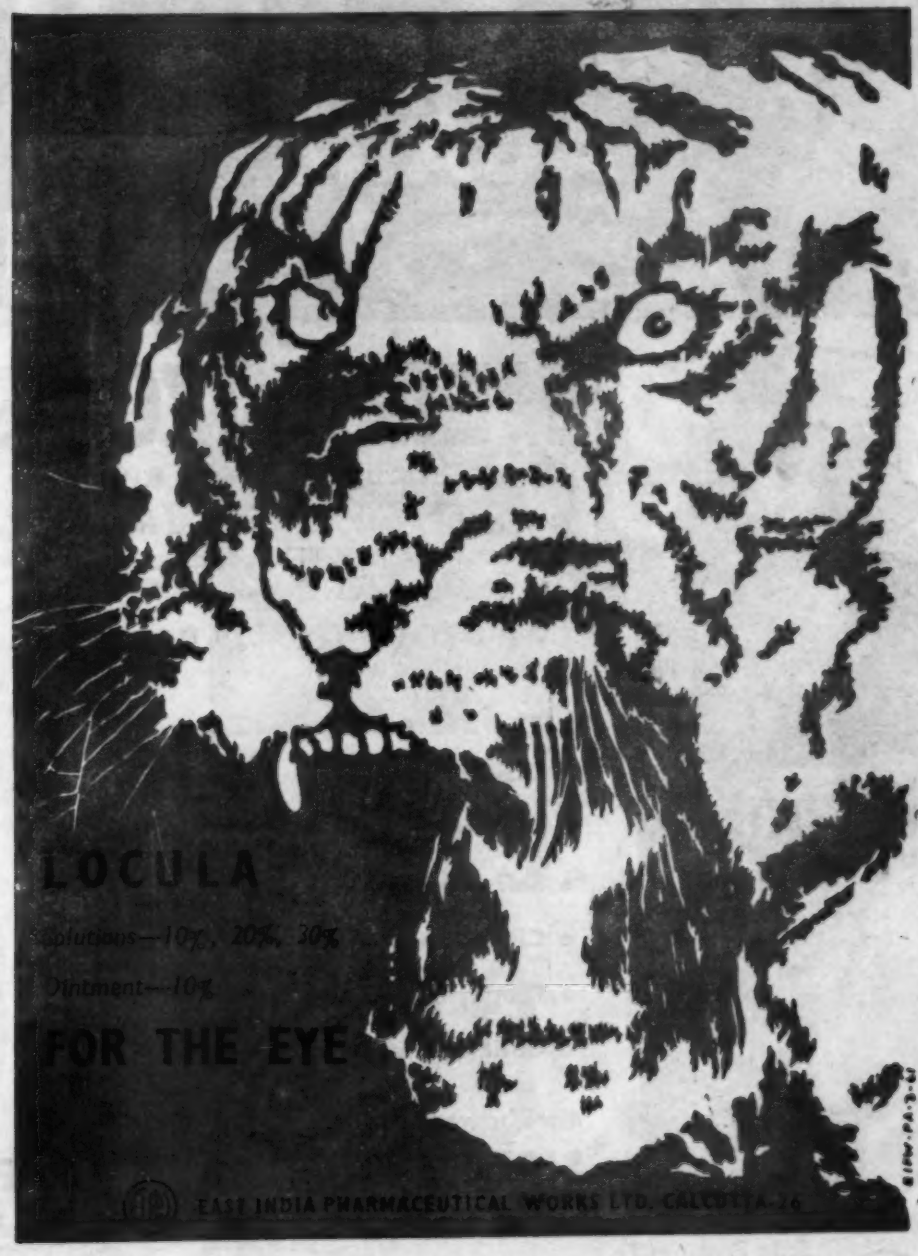
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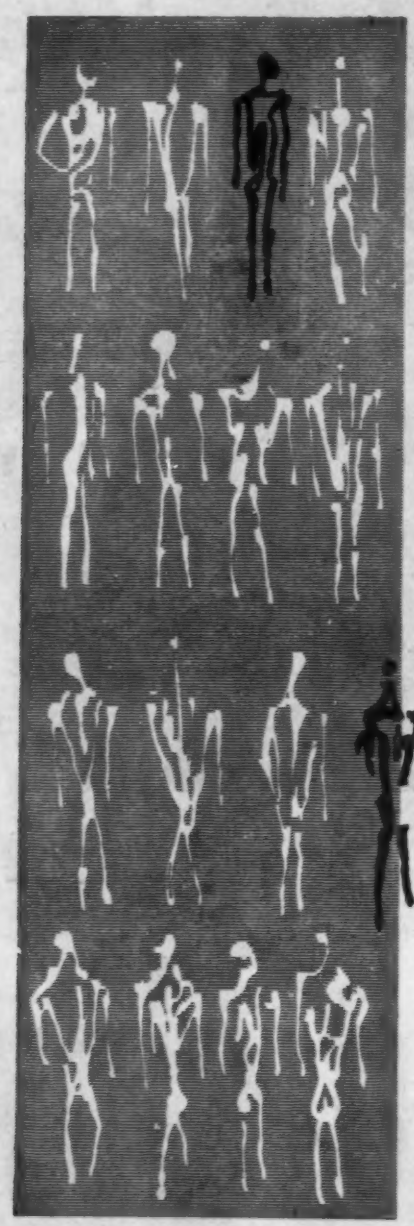

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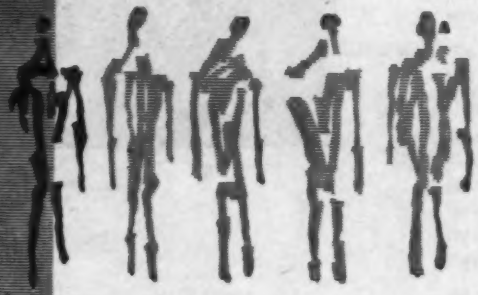

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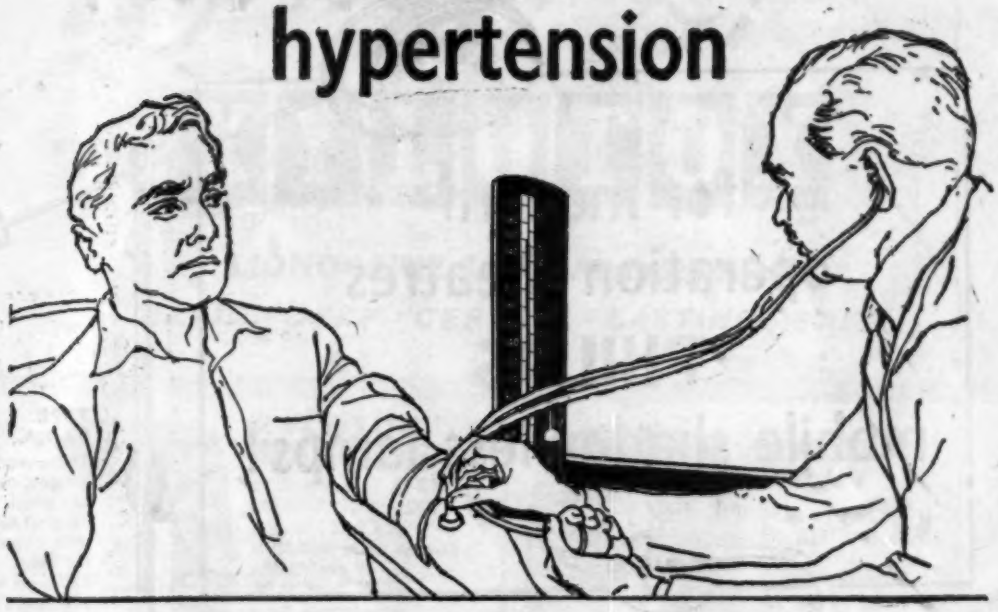

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INDICATIONS

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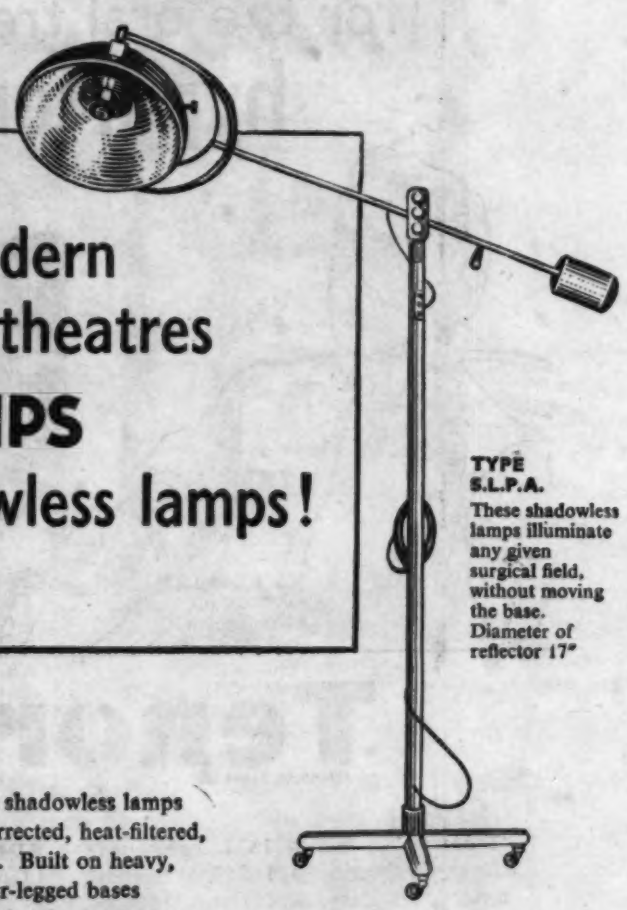

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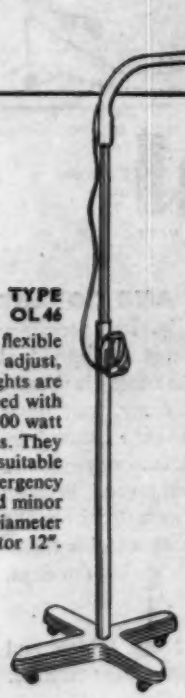

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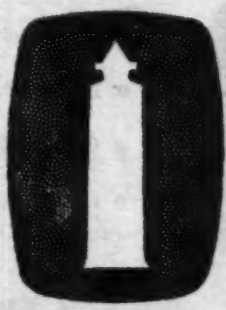

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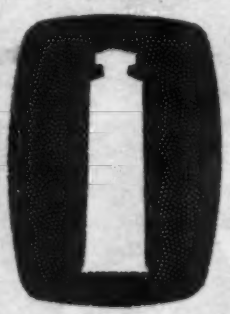

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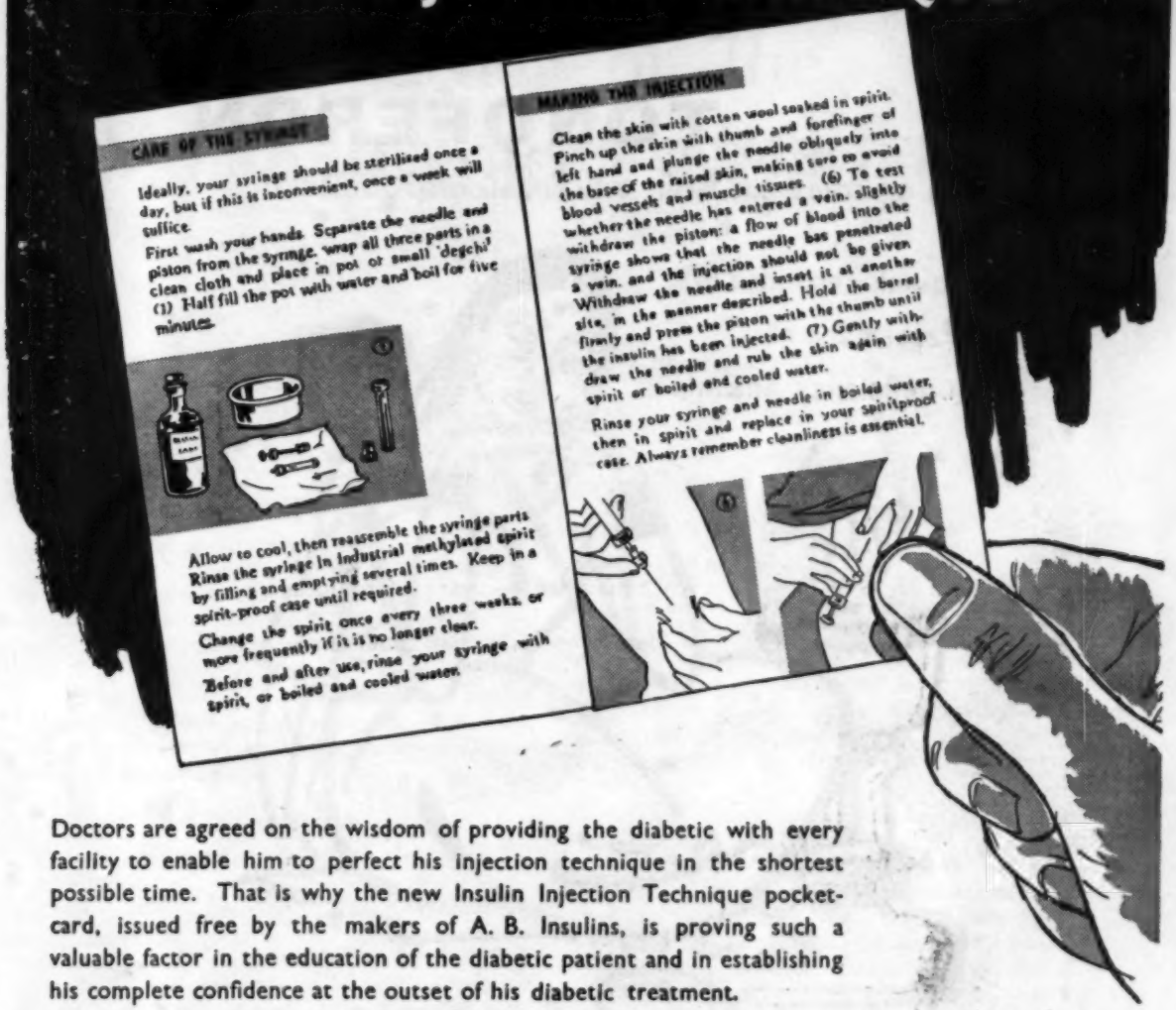
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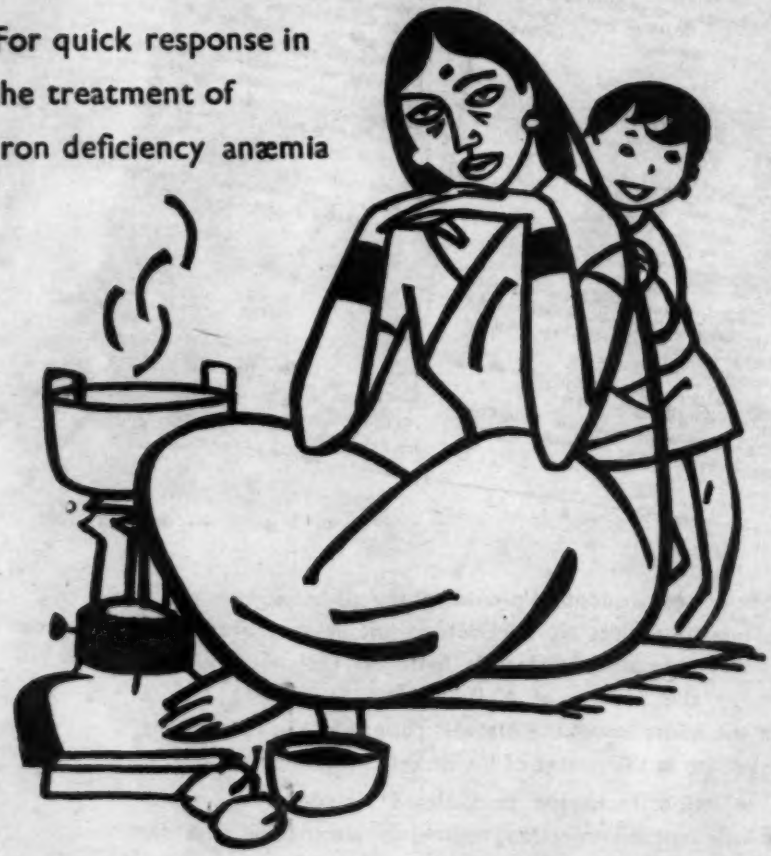

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CALCUTTA
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ORIGINAL ARTICLES

KWASHIORKOR AND MARASMUS IN CALCUTTA

R. N. CHAUDHURI, M.B., F.R.C.P. (EDIN.), T.D.D. (WALES), F.N.I.

A. K. BHATTACHARYYA, M.B.B.S., D.PHIL. (CAL.) AND A. K. BASU, M.B.B.S., D.T.M. & H. (CAL.)

School of Tropical Medicine, Calcutta

The present communication records observations on 350 undernourished and malnourished children admitted to the Hospital attached to the Calcutta School of Tropical Medicine during the period from April, 1957 to September, 1960. They were studied with the following objectives: to distinguish the clinical types in relation to the aetiological factors, to note their clinical features and to undertake certain laboratory investigations including metabolic studies.

CLINICAL TYPES

In accordance with the observations reported earlier (Chaudhuri, 1958; Chaudhuri and Bhattacharyya, 1960a), two main clinical types have been recognised, one is the oedematous fatty type with or without dermatosis and the other is atrophic or wasted type with or without oedema (Figs 1 to 4). They comprised (excluding 64 cases with tuberculosis) the following types:

I. *Fatty type*:
   - (a) Kwashiorkor (classical) with dermatosis ... ... 73 cases
   - (b) Kwashiorkor without dermatosis ... ... 50 cases

II. *Wasted type*:
   - (a) Marasmus with generalised atrophy, depletion of fat and no oedema ... ... 61 cases
   - (b) Marasmic kwashiorkor with wasting plus oedema ... 102 cases

AETIOLOGY

Age and sex—Most cases (74 per cent) occurred between 6 months and 3 years of age. But above 2 years of age classical kwashiorkor was rare and marasmus less frequent, while marasmic kwashiorkor and kwashiorkor without dermatosis were more common. Classical kwashiorkor was predominantly prevalent among female children in this series (45 out of 73). Details are shown in Table 1.

Dietetic history—Eighty per cent of the children studied were breast-fed, in 52 per cent up to the age of 3 months to 1 year and in the rest beyond this period. Seventy-five per cent of the children coming for classical kwashiorkor were being breast-fed at the time of admission and were reported to be 'healthy' before their illness. Twenty cases of this type were recorded at about 1 year of age in fully breast-fed babies. Mothers of 10 such children were admitted to the hospital and the milk, collected by breast pump, was measured daily and found to be normal for the period of lactation. Obviously, this was inadequate for the need of the child. As kwashiorkor without dermatosis was more common in older age groups, a lesser number (about 20 per cent) of this group was being breast-fed at the time of admission. Nevertheless, their intake in early infancy had been reasonably adequate to support the average growth. It was only later when the breast milk became scanty or they were weaned and supplements were inadequate that the dietetic condition became worse and led to the

1 2 3 4

FIGS. 1 TO 4—SHOWING A CASE EACH OF CLASSICAL KWASHIORKOR (1); KWASHIORKOR WITHOUT DERMATOSIS (2); MARASMUS (3); AND MARASMIC KWASHIORKOR (4)

TABLE 1—SHOWING AGE AND SEX INCIDENCE

Age group	Classical kwashiorkor		Kwashiorkor without dermatosis		Marasmus		Marasmic kwashiorkor		Total
	M	F	M	F	M	F	M	F	
4—6 months	—	2	2	1	2	1	1	1	10
6 months to 1 year ...	13	17	1	3	23	10	9	4	80
1—2 years	13	23	9	4	11	7	19	23	109
2—3 years	2	1	9	5	2	4	13	15	51
Above 3 years ...	—	2	9	7	1	—	7	10	36
Total ...	28	45	30	20	39	22	49	53	286

development of the disease. On the contrary, marasmic babies (marasmus and marasmic kwashiorkor) were either never breast-fed or had grossly inadequate breast-milk from early infancy.

Supplements were started very early in one third of the cases and by the age of 6 months two-thirds of children got some supplements which usually included barley and/or sago 1 to 2 oz. in 24 hours sweetened with sugar. Some babies were given 4 to 8 oz. of cow's milk in addition but irregularly. Occasionally, they would get a powder milk supplement prepared in much diluted form. The average intake of protein from the supplements was 10 g. or even less and calorie intake usually 300 to 500 a day. In addition some of them were allowed a share of the adult diet (rice, *dal*, i.e., a gruel made of pulse, vegetables and occasionally fish) but the amount so consumed was very small indeed.

Socio-economic aspect—Poverty was the chief problem of the parents. Maternal malnutrition, illnesses and multiple issues were not infrequently observed. Some were abandoned children due to the death of their mothers. Nevertheless, the 10 mothers admitted, looked quite healthy and no abnormality was detected after investigations including clinical examination, routine blood, stool and urine tests as well as x-ray of chest. Unhygienic environment and faulty methods of infant feeding were important contributory factors. In about 10 per cent of cases, two or more children of the same family were brought to the hospital with similar clinical manifestations reflecting the common dietetic background. Ignorance about the nutritional requirements of a child was great, and it was a common custom to withhold milk for some ailments even when they could afford it. For an attack of diarrhoea or fever, milk including

breast milk would be replaced entirely by barley, sago or candy water.

Infection—A history of diarrhoea at the onset of the illness was obtained in 92·5 per cent of cases. Forty per cent of the children had diarrhoea while in the hospital. In one third of them this subsided with high-protein diet alone. The diarrhoea thus appeared to be non-specific and attributable to protein malnutrition. However, in two-thirds of the cases this was associated with fever, and chemotherapeutics or antibiotics had to be used to obtain clinical response, suggesting besides malnutrition, presence of an infective agent. Forty-four per cent of the cases had febrile episodes at the onset of illness as stated by the parents. Fifty-two per cent of the children had fever while in the hospital. It was due to respiratory (not tuberculous) infections in 35 per cent, staphylococcal infection of the skin or scalp in 17 per cent, associated diarrhoea in 20 per cent, measles in 8 per cent and to various other infections like, urinary tract infection (*E. coli*), typhoid fever, diphtheria, etc., in others. In 12 per cent of the cases, however, no cause was obvious but antibiotics such as penicillin with or without streptomycin given by injections controlled the fever. Tuberculosis of the lungs was found, as pointed out above, in sixty-four cases on routine chest x-ray, but these cases have been excluded from this series. It was more common in the marasmic type. Two of these cases had abdominal involvement as well. It was not only less common but also less severe in the fatty type.

Clinical Features

The clinical features are too well known to be described in detail and only the salient ones are described here. Marasmus developed insidiously either from early infancy or after a period of healthy growth of about six months or more. Following an acute infection and influenced by the socioeconomic factors and dietetic restriction, the marasmic children sometimes developed oedema of legs depicting the picture of marasmic kwashiorkor. The florid picture of classical kwashiorkor or kwashiorkor without dermatosis usually supervened in a somewhat acute form on 'apparently healthy' children exposed to the same factors. Extreme tissue wasting and loss of subcutaneous fat with or without signs of dehydration (even in presence of oedema) were characteristic of marasmus and marasmic kwashiorkor. On the contrary, classical kwashiorkor or the one without dermatosis had enough subcutaneous fat, and muscular wasting if any was not discernible. However, in those cases who suffered for a comparatively longer perior wasting became apparent. This began over the trunk, and later the limbs were also involved. Growth failure, as evidenced by weight and height records, was more marked in the wasted type than in the fatty type.

Diarrhoea and fever, as noted above, were the two chief concomitant clinical features during some phase of the illness. Abdominal distension was common in the wasted type. Changes in the hairs were observed in 174 children mainly in the form of sparseness and dyspigmentation. They were most common and marked in classical kwashiorkor. 'Flag sign' was observed in 13 such cases. Some had patchy alopecia, while complete loss of hair was observed in 7 cases. Besides the usual form of dermatosis, 11 cases of classical kwashiorkor had purpuric or ecchymotic patches which ulcerated in two. Skin infections in the form of scabies, or staphylococcal infection particularly of the scalp, external ear and perineum were observed frequently in all the groups. Liver enlargement of more than 1″ below the costal margin was evident in 34 per cent of cases of classical kwashiokor, while the rest had less than 1″ or no enlargement. Liver biopsy, done in 10 cases, showed extensive fatty changes in classical kwashiorkor and kwashiorkor without dermatosis but practically none in marasmus and marasmic kwashiorkor. The incidence of vitamin A, B and D deficiency signs are presented in Table 2. Vitamin-A deficiency signs include xerosis of conjunctiva and/or keratomalacia. Incidentally, the incidence of vitamin-A deficiency was 35 per cent in the tuberculous cases as compared to 16 per cent in the non-tuberculous cases. Vitamin-B deficiency signs included angular stomatitis, glossitis, stomatitis, cheilosis and blepharitis alone or in combination. They were most frequently met with in classical kwashiorkor. Beading of the costochondral junctions constituted 87 per cent of the cases with vitamin-D deficiency, the remaining cases had deformities of chest. However, beading observed in marasmic children might be

Table 2—Showing the Different Clinical Groups with Incidence (%) of Vitamin Deficiency Signs (Singly or in Combination)

Clinical groups	Vitamin A deficiency	Vitamin B deficiency	Vitamin D deficiency
Classical kwashiorkor (73 cases) ...	5·5	65·7	8·2
Kwashiorkor without dermatosis (50 cases)	28	24	8
Marasmus (61 cases)	13·1	16·4	21·3
Marasmic kwashiorkar (102 cases) ...	19·5	29·4	15·6

more apparent than real as severe emaciation in these cases made the ribs unduly prominent. Rickety manifestations were thus relatively uncommon, possibly because of the arrest of bone growth.

No obvious sign of vitamin-C deficiency was usually met with. However, occasional cases were seen with haemorrhagic spots under the skin, which could not be attributed to any bleeding diathesis. One child had spontaneous separation of epiphysis as well as subperiosteal haemorrhages. He also had haemorrhages under the scalp. The child was seriously ill but responded well to anti-scorbutic therapy (Bhattacharyya, 1961).

Laboratory Findings

The average haemoglobin in marasmus was 11 g. per cent and in the other three groups it usually varied from 8 to 9 g. per cent. Detailed haematological investigations including serum iron and B_{12} studies in these cases have shown that over and above the deficiency of protein the significant factor in the causation of anaemia is iron deficiency in most cases, while in some folic acid deficiency may be present as well (Basu *et al*, 1961). Stools were usually mucoid, greenish yellow and acid. Undigested starch was not infrequently detected. Pus cells were often encountered, at times in considerable number, epithelial cells were frequently observed, red cells were scarce and bacterial culture (done in all cases having diarrhoea) usually revealed *E. coli* except on two occasions where *Sh. flexner* was isolated. Ascariasis was detected in 8·7 per cent, hookworm in 3·5 per cent, giardiasis in 16·7 per cent, amoebiasis in 2·9 per cent and taeniasis in 0·7 per cent. A trace of albumin in the urine was detected in 31 cases of kwashiorkor and 3 cases of marasmus ; this gradually cleared off. The urine was normal microscopically. The most common abnormality was hypoproteinaemia especially in kwashiorkor. In marasmus the serum proteins were higher than in any other group although the protein level was below normal in all. The details are shown in Table 3.

Nitrogen Balance Studies

Nitrogen balance studies were done in 51 children including 3 normal ones (Chaudhuri and Bhattacharyya, 1960b ; Bhattacharyya and Chaudhuri, 1960 ; Bhattacharyya and Chatterjee, 1961). Protein intake from skimmed milk varied from 3 to 16 g./kg/day. Absorption was normal ordinarily but impaired if there was diarrhoea or worm infestation. High nitrogen retention was characteristic of all cases ; they had greater avidity for nitrogen as compared to normal children. The nitrogen retention usually decreased after treatment with high protein diet indicating replenishment of body proteins. This was relatively quick in the fatty type and slower in the wasted type. These observations suggest that in the former the depletion of tissue proteins is more acute but lesser in absolute quantity, while in the latter it is chronic and greater in absolute quantity. This was also borne out by the pattern of response to treatment in average cases. Prolonged treatment was needed for the wasted type while the other usually recovered within a month. Increased retention was again observed following an attack of infective fever such as measles, showing clearly that infection worsens protein malnutrition. Studies with lower protein intake (e.g. 3 g./kg./day) revealed negative balance and poor weight gain, suggesting the need of high protein diet in treatment.

Table 3—Showing Serum Proteins (g. %), Total and Albumin, in Different Clinical Groups on Admission and on the 10th and 30th Days of Treatment with Skimmed Milk

	Classical kwashiorkor			Kwashiorkor without dermatosis			Marasmus			Marasmic kwashiorkor		
	No.	Mean	S.D.±	No.	Mean	S.D.±	No.	Mean	S.D.±	No.	Mean	S.D.±
Total protein :												
On admission ...	42	4·09	0·90	40	4·39	1·10	46	5·42	0·72	73	4·68	0·90
On 10th day ...	18	5·78	1·11	23	4·97	1·21	9	6·30	0·52	40	5·52	0·77
On 30th day ...	24	6·31	0·74	21	6·07	0·94	25	5·59	0·67	50	6·24	0·58
Albumin :												
On admission ...	42	2·02	0·58	40	2·03	0·81	46	3·01	0·66	73	2·34	0·73
On 10th day ...	18	2·80	0·87	23	2·60	0·83	9	3·59	0·86	40	3·00	0·70
On 30th day ...	24	3·53	0·60	21	3·52	0·79	25	3·86	0·59	50	3·57	0·52

No.=Number of cases studied. S.D.=Standard deviation. The mean serum protein values in different clinical groups were significantly different on admission and on the 10th day but not on the 30th day.

Treatment

Problems of initial management were diarrhoea, dehydration and infection which were dealt with by giving fluid and electrolytes and appropriate chemotherapy or antibiotics. The emergency treatments resorted to in severe cases were (a) 5 per cent glucose or ¼N saline glucose solution for marked dehydration, (b) blood transfusions for severe anaemia and shock and (c) gastric lavage for vomiting and inability to retain food. Personal attention and good nursing care were arranged as best as possible. Each feed including the amount rejected was recorded. Proteins were supplied from skimmed milk in all except those receiving vegetable proteins (104 cases) or whole milk (25 cases). To start with, the feeds were small at a time and if required tube-feeding was resorted to. For diarrhoeic cases skimmed milk was acidified with lactic acid and diluted ; potassium chloride was also given orally. Sulphaguanidine or streptomycin orally often helped to control the diarrhoea. The feeds were gradually increased to 6-10 g. protein/kg. body weight. Vitamins were only given in special cases, viz., vitamin-A injections for keratomalacia. However, in spite of such treatment about one third of the cases with ocular lesions lost vision as the disease process was far advanced in them. Riboflavin was administered in 8 severe cases in addition to skimmed milk and apparently hastened the recovery of skin lesions. The average period of treatment was one month. The serum proteins improved (Table 3), but there was no significant rise in haemoglobin. The children gained in weight but this was often poor in marasmic cases. A series of 25 nondiarrhoeic cases was given whole milk. They could tolerate it well and the weight gain in those children was strikingly better than that observed in cases treated with skimmed milk.

Uncommon neuromuscular symptoms were encountered in 9 cases during treatment. Rigidity of flexor groups of muscles and tremor were observed in 8 cases of classical kwashiorkor. Tremors of hands developed also in a case of marasmic kwashiorkor during treatment. These cleared off later ; in one case striking response was noticed after a plasma transfusion. The cerebrospinal fluid was examined in 5 of these cases and the only abnormality that could be detected was low protein content (12-15 mg./100 ml.), which increased (25 to 35 mg./100 ml.) with the patients' recovery. A few children also developed 'pendulum nodding' of the head during treatment ; this subsided gradually.

One hundred and four cases were treated with vegetable proteins. The following preparations were used :

1. Foods A and B, processed at the Central Food Technological Institute, Mysore, were used (Chaudhuri *et al*, 1960a). Food A was a mixture of defatted groundnut flour, roasted Bengal gram flour and lucerne powder, while Food B contained sesame flour in addition. Except for the slower rate of regeneration of serum albumin as compared to skimmed milk, these foods were effective. Some children however, did not like their taste, specially that of Food B which had to be replaced by milk.

2. A gruel was prepared from locally available cheap articles, viz., roasted Bengal gram (*Cicer arietinum*) flour 7 oz. (or less at the start), fresh leafy vegetables such as *puin sak* (*Basella alba*) 2 oz. and *gur* (jaggery) 2-3 oz. supplying about 50 g. of protein, 1100 calories and 25 mg. of iron per day for a child of one year. The food was prepared with Bengal gram flour mixed with water (or rice-water if possible) and cooked along with finely chopped or smashed leafy vegetables to attain the desired consistency, syrup of jaggery prepared by boiling the same in water and straining, being added before each feed to sweeten. Feeds about 8 oz. each were given three hourly. In suitable cases, especially during convalescence, an ounce of Bengal gram flour was substituted by an ounce of rice in the preparation of the gruel. The diet was well tolerated. The diarrhoea when present subsided and the children gained in weight, but as with Food A and B regeneration of serum albumin appeared to be slow, as compared to skimmed milk. This diet however had a beneficial effect on the regeneration of haemoglobin as borne out by significant improvement of the associated anaemia.

3. It was evident from the dietetic history of these children that they often received 4 to 8 oz. of cow's milk ; therefore a trial was also conducted with the above gruel diet with 8 oz. of milk in addition (Chaudhuri, 1958). This had better results as regards the gain in weight and regeneration of serum albumin.

Prognosis

Marked apathy, anorexia and vomiting, extensive and persistent oedema, refractory skin changes, intractable diarrhoea and dehydration, marked hypoproteinaemia, and respiratory infections not responding to antibiotics were of grave prognostic significance. Mortality in this series was 23·4 per cent (67 out of 286 cases), including 14 per cent (40 cases) dying

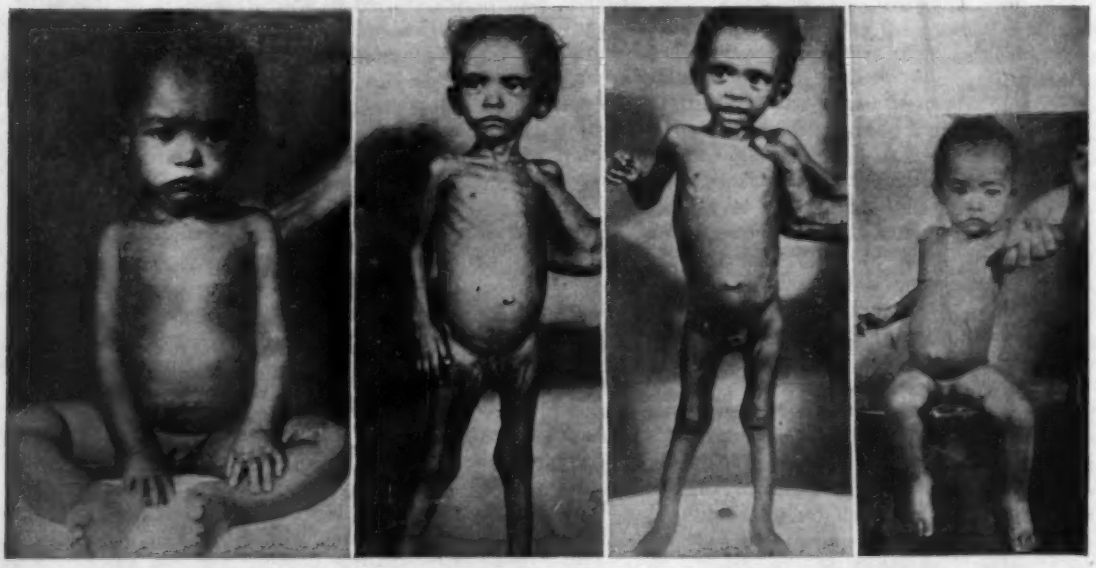
within 48 hours of admission. The immediate causes of death were diarrhoea, dehydration and respiratory infections. However, death occurred suddenly in 14 children and the cause was not apparent.

Autopsy

In the total series of 350 children, out of 73 deaths, autopsy was done in 29 cases (classical kwashiorkor 10, kwashiorkor without dermatosis 5, marasmus 3, marasmic kwashiorkor 11).

Table 4—Showing Clinical Types as Diagnosed on Re-admission and Results

Case No.	1st admission	2nd admission	3rd admission	4th admission	Results
1	Marasmic kwashiorkor	Marasmic kwashiorkor	—	—	Improved and discharged
2	Marasmus	Marasmic kwashiorkor	—	—	—do—
3	Marasmus	Marasmus	Marasmic kwashiorkor	—	Died in hospital
4	Kwashiorkor without dermatosis	Classical kwashiorkor	Marasmic kwashiorkor	—	Improved and discharged
5	Classical kwashiorkor	Marasmic kwashiorkor	—	—	Died in hospital
6	Marasmus	Marasmus	—	—	—do—
7	Kwashiorkor without dermatosis	Marasmic kwashiorkor	Marasmic kwashiorkor	Marasmic kwashiorkor	Improved and discharged
8	Classical kwashiorkor	Marasmic kwashiorkor	—	—	—do—
9	Kwashiorkor without dermatosis	Marasmic kwashiorkor	—	—	Improved and discharged
10	Classical kwashiorkor	Classical kwashiorkor	—	—	—do—
11	Classical kwashiorkor	Marasmic kwashiorkor	—	—	Died in hospital
12	Marasmus	Marasmic kwashiorkor	—	—	Improved and discharged



A B C D

Fig. 5—Showing a Case of Kwashiorkor without Dermatosis (Case 7, Table 4) Passing into Marasmus and Marasmic Kwashiorkor: (A) On First Admission (26-2-59); (B) On Second Admission (8-5-59); (C) On Discharge (13-6-59); (D) On Third Admission (5-11-59).

Briefly, it revealed (alone or in combination) bronchopneumonia in 8 cases, empyema in 1, tuberculosis in 3 (pulmonary 2, intestinal 1), adrenal haemorrhages in 3, oesophageal ulcers in 1, and distended and/or atrophied intestines in all, congested and ulcerated large intestine in 4, atrophic pancreas in 8 and markedly oedematous brain in 11. While the liver was grossly fatty in classical kwashiorkor or kwashiorkor without dermatosis, it looked practically normal though reduced in size in marasmus and marasmic kwashiorkor. The degree of fatty liver seemed to be directly proportional to the depot fat present. A big mucus plug was observed at the bifurcation of the trachea in a child who died suddenly. Detailed histological examinations of the kidneys (Sen Gupta *et al*, 1960) and adrenals (Chatterji and Sen Gupta, 1960) were undertaken by the department of pathology of this institution.

Relapse

Many of the patients were followed up in the outpatient department and twelve of them were readmitted for 'relapses' which occurred more than once in three patients. It was interesting to observe that in eight of these twelve patients the clinical types as observed on first admission underwent transformation into other types at relapse, suggesting their common origin (Table 4). This change took place mostly in cases of kwashiorkor with or without dermatosis, converting them into a marasmic state (Fig. 5), but the converse was not observed.

Discussion

Since the recognition of the syndrome of kwashiorkor by Williams (1931-32), the disease has been reported from almost all over the underprivileged part of the world (Brock and Autret, 1952 ; Autret and Behar, 1954 ; Trowell *et al*, 1954 ; Waterlow and Vergara, 1956). The occurrence of the condition has been reported and the syndrome investigated in many parts of India (Achar, 1950 ; Patwardhan, 1952 ; Gopalan and Ramalingaswami, 1955 ; Someswara Rao *et al*, 1959). Reports from Calcutta were made by Chaudhuri (1947) and Mukherjee and Jelliffe (1955).

Association of variable degree of undernutrition with kwashiorkor has been a source of considerable confusion in the study of the disease and an intermediary type between kwashiorkor and marasmus has been described (Jelliffe *et al*, 1954). Although the exact pathogenesis of kwashiorkor and marasmus is yet to be cleared up, there is an increasing tendency to regard them as primarily due to both protein and calorie deficiency and not to protein alone. It appears from the present study in Calcutta that they are manifestations of severe infantile malnutrition. On one end of the spectrum, there are wasted children with no oedema (nutritional marasmus) and on the other extreme there are oedematous cases with plenty of subcutaneous fat and dermatosis (classical kwashiorkor). Intermediate cases include wasted children with subsequent development of oedema (marasmic kwashiorkor) and oedematous cases with subcutaneous fat but no dermatosis simulating so-called nutritional oedema (kwashiorkor without dermatosis). These types are conditioned by chronicity, variations in the adequacy of breast feeding and supplements, and in the severity of the intercurrent infection. It is known that many children belonging to low socio-economic group of parents suffer from a subclinical deficiency state chiefly characterised by failure of growth (Waterlow, 1953 ; Trowell *et al*, 1954 ; Patwardhan, 1955 ; Sebrell *et al*, 1959). The history and clinical observations in the present series indicate that when such children are abruptly subjected to further restriction of food consisting of nothing but thin starchy gruel owing to an acute diarrhoeal or febrile episode, they develop the florid picture of classical kwashiorkor or the one without dermatosis, the aetiological difference between the two being not clear. From the direct relationship between the amount of subcutaneous fat and the degree of fatty liver as seen in this condition, it appears that during an acute episode of infection with deprivation of food the body mechanism mobilises the depot fat, as in states of inanition (Dible, 1932). Fat accumulates in the liver but the organ fails to utilise it possibly due to an unknown metabolic or enzymatic block. With protein diet this block is overcome as is borne out by the rapid response of the condition, if not too far advanced, to skimmed milk. If inadequately fed the child may thrive on, but gradually loses his subcutaneous fat and eventually passes into a state of marasmus. On the other hand, a child subsisting on scanty or no breast milk and grossly inadequate supplements from early infancy fails to grow due to the lack of essential amino-acids. To compensate for the grossly inadequate calories, depot fat is gradually utilised leaving ultimately little or none in the body and the child becomes markedly wasted. The body metabolic process appears to be maintained but with little or no growth. Blood proteins are reduced though not so markedly as in the acute state of kwashiorkor. There is little or no fatty change in the liver. If such a marasmic child

suffers from a severe or recurrent diarrhoea or other infection, he is subjected to further depletion of body proteins. Oedema may supervene giving the clinical picture of marasmic kwashiorkor.

The fact that one type may pass into another is of considerable interest indicating that the clinical pictures are the manifestations of the same aetiologic process, viz., protein and calorie deficiency conditioned or precipitated by infection, the role of which in the causation of infantile malnutrition has been stressed by Platt (1957), Scrimshaw *et al* (1959) and others. However, the frequent association of various vitamin deficiency signs and iron and/or folic acid deficiency anaemia suggest that multiple factors are involved in the production of the clinical picture.

Management consists in combating the infection and correction of fluid and electrolyte disturbances which are as important as proper feeding. As regards diet, there is no doubt that milk is the effective preventive and therapeutic agent for protein malnutrition. However, it has been realised that substitutes for milk are necessary. Consequently, efforts have been directed towards finding additional resources of high protein foods that might be useful. The Joint FAO-WHO Expert Committee on Nutrition (1953) in their third report recommended the use of foods of vegetable origin and suggested that these preparations and combinations should, in general, be based on foods which are locally available and which can be prepared by individual families or at the village level. In India, Bengal gram flour has been used for the purpose (Venkatachalam *et al*, 1956). A number of vegetable protein preparations were tried during the present study and a gruel prepared of roasted Bengal gram flour and leafy vegetables with or without a little rice was found to be quite satisfactory. This is supported by the observation that addition of green leafy vegetables improves the protein efficiency ratio (P.E.R.) of cereals or pulses (Phansalkar *et al*, 1957). The food can be easily prepared at home, is tasteful and acceptable and costs not more than twenty-five naye paise for a day's feeding. The effect on the disease unless advanced is good though slower than that with skimmed milk. Milk from breast or other sources which may be available at home is, of course, encouraged along with this food. As a matter of fact the trial with a similar diet containing 8 oz. of milk a day gave better results. Prophylaxis may be based on the supply of vegetable proteins by 'supplementary feeding' programmes for infants and young children of the low socio-economic group of population.

Summary

Observations on 350 cases of kwashiorkor and marasmus in children including 64 tuberculous ones are presented. The general picture was one of severe malnutrition. Of the aetiological factors, defective feeding and infection appeared to be most significant. The infection was bacterial (viz., diarrhoea, respiratory, cutaneous etc.) in most cases, and viral (viz., measles) and parasitic (viz., roundworm) in others. Although most of the children were breast-fed, poverty and ignorance resulted in very poor intake of proteins and calories. Broadly speaking, there were two types of cases—marasmus and kwashiorkor. The former comprised emaciated children with depletion of body fat and was associated with chronic and severe under-nutrition since early infancy. These cases might develop oedema later on after some intercurrent infection. Kwashiorkor with or without dermatosis, on the other hand, developed somewhat abruptly in apparently healthy children subsisting on moderately inadequate diet and put on restricted starchy diet following an acute infection. Thus there were the fatty and the wasted types ; the former divided into (a) kwashiorkor (classical) with dermatosis and (b) kwashiorkor without dermatosis and the latter into (a) marasmus with emaciation but no oedema and (b) marasmic kwashiorkor with wasting plus oedema. Follow-up study showed that the fatty type might change into the wasted type during the course of illness.

Diarrhoea and fever were the chief clinical features at onset. Wasting, dehydration, oedema and skin changes were present according to the types of cases seen. Hypoproteinaemia was common to all, most marked in kwashiorkor groups and less in marasmus. The liver showed extensive fatty changes in the fatty type, but hardly any in the wasted type.

Nitrogen balance studies revealed impaired absorption only in cases with diarrhoea and worm infestation. From the pattern of nitrogen retention it was inferred that protein deficiency is acute but lesser in absolute quantity in the fatty type, while it is chronic and greater in the wasted type and that a high protein diet is essential for the treatment of these disorders.

If not too far advanced, the prognosis is good. Unfavourable features are extensive and persistent oedema, intractable diarrhoea with dehydration, and respiratory or other infections not responding to treatment.

Management of these cases consisted, besides proper feeding, in treating diarrhoea and dehydration, and other infections. Milk is of course the

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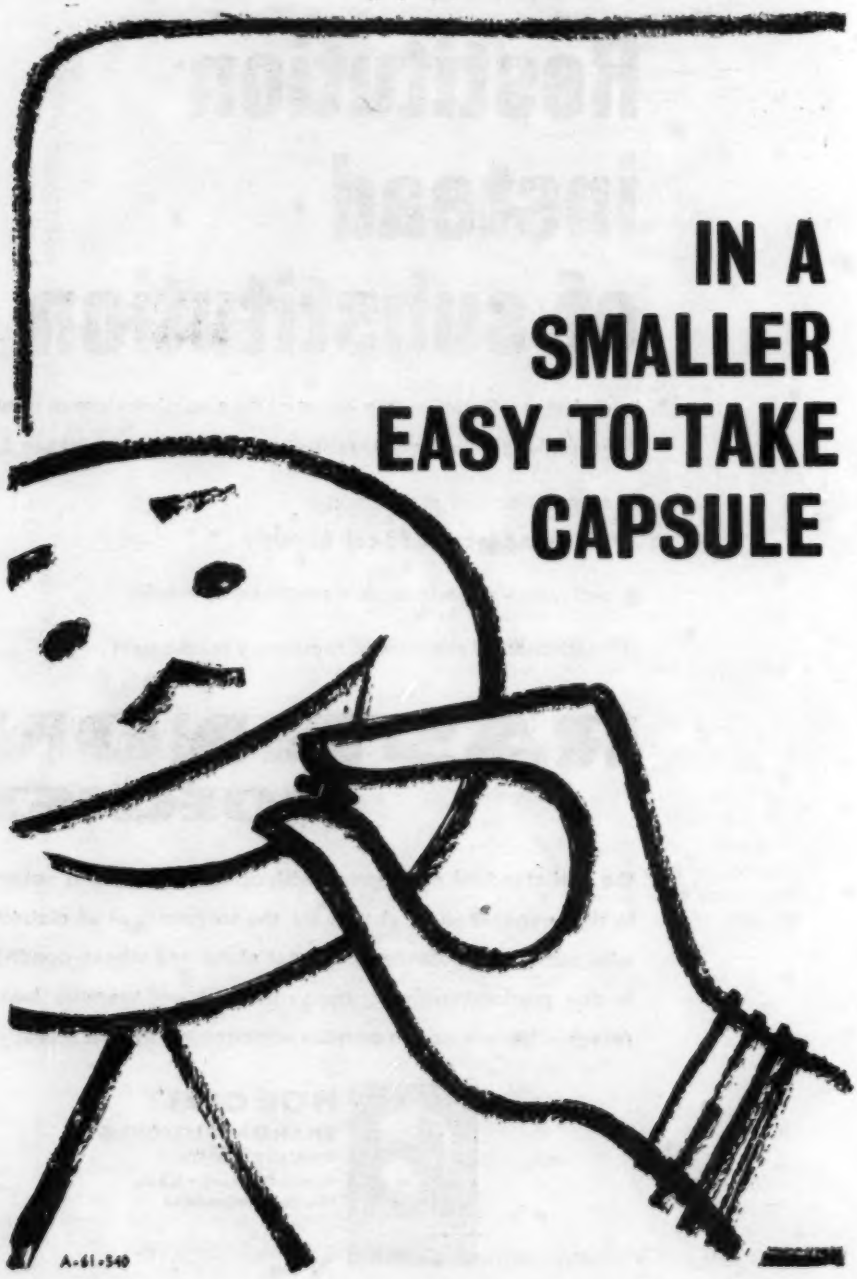
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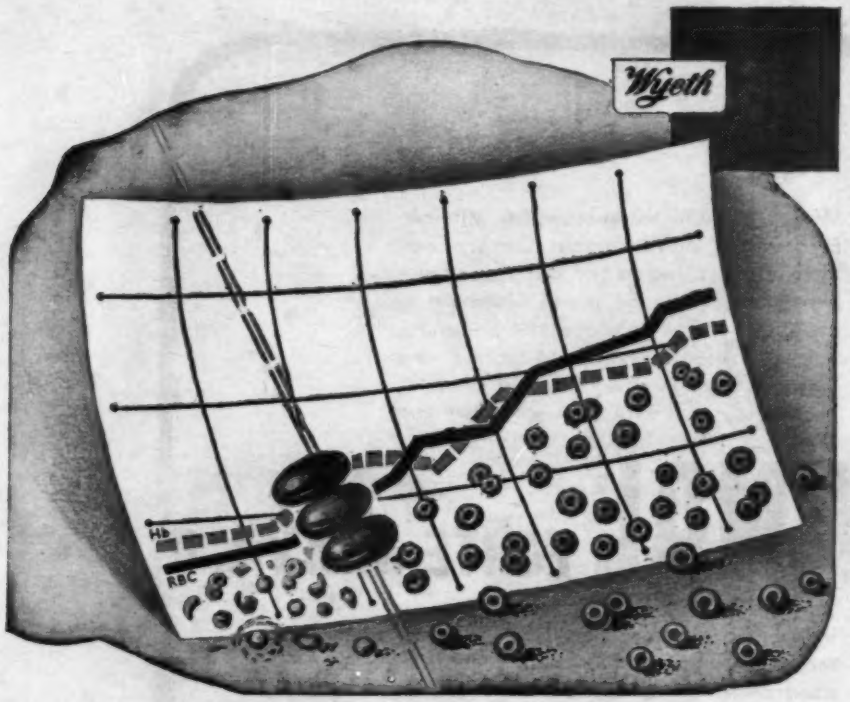

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most effective form of diet, but vegetable protein preparations also gave satisfactory results though not quite as good as the former particularly in regenerating serum albumin.

In countries where economic causes still form the greatest barrier to a higher level of nutrition especially in children and projects designed to raise the living standard involve long standing measures, much can be achieved by making the best use of all locally available resources and by introducing acceptable supplementary protein foods of vegetable origin along with adequate measures to control infections.

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A STUDY OF CEREBROVASCULAR STROKES

A Statistical Analysis of 476 Cases with Detailed Study of 108 Cases

DEVI CHAND, M.D., F.C.C.P., F.A.C.C.*

Professor of Clinical Medicine
Lady Hardinge Medical College

AND

R. K. CAROLI, M.D.

New Delhi

With the advent of antibiotics and other therapeutic remedies, many illnesses which hitherto were amongst the 'captains of death', have been shifted to the background. Consequently, along with other similar conditions, cerebrovascular strokes are coming up among the major agents which blow out 'life's little candle'.

From India, particularly from its northern part, not much work on the subject has been re-

* Since deceased.

ported in the medical literature. Padmavati *et al* (1957) reviewed 46 female cases from Lady Hardinge Medical College, Delhi. From Calcutta, Banerjea and Maity (1956) reported an analysis of 102 cases and another 116 cases were reported from Jamshedpur by Khan and Rao (1959).

Delhi, being a capital city with all its hurried life, cosmopolitan population and diverse socio-economic strata, seemed to be a good field for exploration in the direction of the incidence and analysis of cerebrovascular strokes. Our cases have been taken from two major hospitals which cater to the needs of a fairly good cross section of Delhi's population.

Material

In this paper an analytical study has been made of cases admitted with cerebrovascular strokes to the Willingdon Hospital and Nursing Home and the Irwin Hospital during a period of 3½ years from January 1956 to March 1959. In all, 476 cases were admitted with cerebrovascular strokes in the Irwin and the Willingdon Hospitals. The cases from the latter hospital have been subjected to a comparatively more detailed study in view of the more comprehensive data being available and form the main part of this work.

Observation

The results of observations are analysed under different headings of incidence, age incidence, sex incidence, etc., and shown in Table 1-13. In these tables the italicised figures in parentheses indicate the percentages of incidence.

Incidence—In this series, the average incidence of cerebrovascular strokes was 3·5 per cent in the Willingdon Hospital and Nursing Home and 1·9 per cent in the Irwin Hospital (Table 1). This discrepancy may be due to the fact that the Irwin Hospital being near the old city of Delhi, caters more to the people of low socio-economic status, and the number of beds being larger, more routine non-emergency cases are admitted here—thus, swelling the number of total medical admissions compared to the Willingdon Hospital.

The overall incidence in this series, however, was higher than that reported by Khan and Rao (*loc. cit.*) who reported an incidence of 0·58 per cent of 7,414 total admissions in the Hospitals, 3,158 were medical, out of which 108 (3·9 per cent) were cases with cerebrovascular strokes.

Age incidence—The maximum age incidence was between 51-60 years, with 43 cases (39·56 per cent). Above 60 years there were 32 cases (29·44 per cent). There were 23 cases (21·16 per cent) between 41-50 years. Thus there was a sharp increase in incidence above 40 years of age, reaching to a maximum at 51-60 years, and thereafter gradually declining above 60 years (Table 2). In the younger age groups, as will be seen later, cases were mostly due to embolism secondary to cardiovalvular affections.

Banerjea and Maity (*loc. cit.*) reported maximum incidence between 41-50 years and 51-60 years (equal in both groups). Above 60 in their series the incidence fell sharply. In our cases,

Table 1—Showing Number of Medical Admissions with Cerebrovascular Accidents

Year	No. of admissions (medical)	No. of cases of cerebrovascular accidents
WILLINGDON HOSPITAL		
1956	703	26 (*3·5*)
1957	868	33 (*3·8*)
1958	1,204	42 (*3·4*)
Total ...	2,775	101* (*3·5*)
IRWIN HOSPITAL		
1956	2,312	65 (*2·08*)
1957	7,217	148 (*2·02*)
1958	6,647	115 (*1·7*)
Total ...	16,176	328* (*1·9*)

Italicised figures in parentheses indicate percentages.
* During the period from 1st January 1959 to the end of March 1959, 7 more cases were admitted to the Willingdon Hospital and 40 to the Irwin Hospital making the total 108 and 368 respectively and the joint total 476.

Table 2—Showing Incidence of Age and Sex in the 108 Cases at the Willingdon Hospital

Age groups (years)	Sex		
	Male	Female	Both sexes
Below 20 ...	1 (*0·92*)	—	1 (*0·92*)
21 — 30 ...	1 (*0·92*)	2 (*1·84*)	3 (*2·76*)
31 — 40 ...	5 (*4·6*)	1 (*0·92*)	6 (*5·58*)
41 — 50 ...	22 (*20·2*)	1 (*0·92*)	23 (*21·16*)
51 — 60 ...	42 (*38·64*)	1 (*0·92*)	43 (*39·56*)
Above 60 ...	31 (*28·52*)	1 (*0·92*)	32 (*29·44*)

Italicised figures in parentheses indicate percentages.
N.B. In this hospital the number of beds is 16 for females against 69 for males.

however, the incidence above 60 years was greater (29·44 per cent) than that between 41-50 years (21·16 per cent). Khan and Rao (*loc. cit*) reported maximum incidence at 40-50 years (39 per cent). It fell above 50 years (21 per cent), and went down steeply above 60. They reported a higher incidence (30 per cent) in the 30-40 years age-group, whereas our figures were 5·52 per cent only.

Sex incidence—In the Willingdon Hospital and Nursing Home, only 6 female cases were admitted between January 1956 and March 1959 (Table 2). This rather low incidence is probably due to the fact that the number of female beds in this Hospital is very limited. Of these six cases, the maximum age incidence was between 21-30 years. In the males the incidence follows closely the total incidence in relation to age.

In 1958, only 39 females were reported out of the total of 115 cases from the Irwin Hospital (Table 3). The total number of female admissions was 2,204, bringing the incidence to 1·6 per cent. Incidence in male cases was 1·8 per cent.

TABLE 3—SHOWING INCIDENCE IN RELATION TO SEX IN THE 115 CASES OF THE IRWIN HOSPITAL DURING 1958

Incidence	Total	Male	Female
No. of medical admissions ...	6,674	4,470	2,204
No. of cases with cerebro-vascular strokes ...	115	76	39
Percentage	1·7	1·8	1·6

Banerjea and Maity (*loc. cit.*) reported the ratio of males to females as 2·2 : 1 and Khan and Rao (*loc. cit.*) as 2·8 : 1.

Occupation and socio-economic status—Tables 4 and 5 show that the incidence among government employees is much higher than that among the public. But in the Willingdon Hospital and Nursing Home, the percentage of admissions of government employees is about 60, as compared to 40 from the public.

Background factors—Out of 108 cases (Table 6), 42 (38·6 per cent) had some degree of hypertension ; 36 (33 per cent) of diabetes mellitus and of the latter, 6 were also hypertensives, 5 cases had blood serologic test for syphilis strongly positive, 15 cases were ascribed to atherosclerosis alone, and did not have any evidence of hypertension, diabetes or any other factor. Thus in our series, hypertension has maximum incidence as a background factor, next are diabetes and

TABLE 4—SHOWING THE SOCIO-ECONOMIC STATUS OF THE 108 CASES OF CEREBRAL VASCULAR ACCIDENTS

(Combined Study of General Ward and Nursing Home Cases, Willingdon Hospital)

INCOME GROUPS		
Less than Rs. 100 P.M.	Rs. 100—500 P.M.	Rs. 500 P.M.
24 cases *(22·08)*	40 cases *(36·8)*	44* cases *(40·48)*

Italicised figures in parentheses indicate percentages.
* Includes 21 cases from the nursing home where Government servants with basic pay of Rs. 500 P.M. or other rich patients who can afford to pay are admitted.

syphilis in that order and the miscellaneous including post-delivery (4 cases), valvular lesions (3 cases), subarachnoid haemorrhage (2 cases) and postinfarction episodes (1 case) follow closely.

Banerjea and Maity (*loc. cit.*) reported 30 cases with a background of hypertension from 102 cases studied by them, while diabetes mellitus was detected in only one case. In our series, diabetes mellitus figured more prominently as a background factor. Khan and Rao (*loc. cit.*) reported only 3 per cent incidence of diabetes mellitus as a background factor.

Out of 108 cases (Table 7) 88 (80·9 per cent) were diagnosed as cerebral thrombosis ; 13 as cerebral haemorrhage (out of which the C.S.F. contained blood in 8 cases), 4 as embolic episodes ; 2 as subarachnoid haemorrhage and one as cavernous sinus thrombosis.

In our series, thrombosis was the commonest lesion (80·9 per cent). In the series reported by Khan and Rao (*loc. cit.*) the incidence of thrombosis was 54 per cent, haemorrhage 33·6 per cent and embolism 5·2 per cent.

Banerjea and Maity (*loc. cit.*) reported 45 cases with thrombosis and 44 with haemorrhage out of the 102 cases.

Millikan and Moerch (1953) reported 82·5 per cent thrombosis, 6·7 per cent haemorrhage and 10·5 per cent embolism. These figures are considerably nearer to our own findings.

Arring and Mennit (1935) after a postmortem study of 245 cases with cerebrovascular strokes reported the incidence as cerebral thrombosis 43·47 per cent, haemorrhage 47·3 per cent and embolism 9·3 per cent.

It is obvious that figures of postmortem studies may not tally well with those obtained from clinical studies.

TABLE 5—SHOWING INCIDENCE OF CEREBROVASCULAR STROKES IN RELATION TO OCCUPATION AMONGST 108 CASES OF THE WILLINGDON HOSPITAL

OCCUPATIONS										
Ministerial level	Secretaries and other "class I" officers	Section officers or other "class II" employees	Clerks		Peons & "class IV" employees	Business-men	Profes-sional men	Low income group from public	House-wives	Miscella-neous & unknown
			Upper division	Lower division						
1*	9	14	18	14	6	17	7	12	6	4
(0·92)	*(8·28)*	*(12·88)*	*(16·56)*	*(12·88)*	*(5·52)*	*(15·64)*	*(6·44)*	*(11·14)*	*(5·52)*	*(3·78)*

*A Burmese monk.

Italicised figures in parentheses indicate percentages.

TABLE 6—SHOWING INCIDENCE OF BACKGROUND FACTORS IN THE 108 CASES OF THE WILLINGDON HOSPITAL

BACKGROUND FACTORS									
Hyper-tension	Diabetes mellitus			Athero-sclerosis	Syphilis	Post-delivery	Cardio-valvular disease	Subarach-noid hae-morrhage	Myocardial infarction
	Without hyper-tension	With hyper-tension	Total						
42 cases	30 cases	6 cases	36 cases	15 cases	5 cases	4 cases	3 cases	2 cases	1 case
(38·6)	*(27·6)*	*(5·5)*	*(33)*	*(13·8)*	*(4·5)*	*(3·6)*	*(2·7)*	*(1·8)*	*(0·92)*

Italicised figures in parentheses indicate percentages.

TABLE 7—SHOWING INCIDENCE OF PATHOLOGICAL LESION IN THE 108 CASES OF THE WILLINGDON HOSPITAL

Cerebral thrombosis	Cerebral haemorrhage			Embolism	Subarachnoid haemorrhage	Cavernous sinus thrombosis
	With blood in C.S.F.	Without blood in C.S.F.	Total			
88 cases	8 cases	5 cases	13 cases	4 cases	2 cases	1 case
(80·9)	*(7·3)*	*(4·5)*	*(11·8)*	*(3·6)*	*(1·8)*	*(0·92)*

Italicised figures in parentheses indicate percentages.

We have included the so-called cases of 'vasospasm' (transient palsies) in the group of thrombosis, though there is much controversy in this issue. The general consensus of opinion however tends to discount the theory of vasospasm.

Mode of onset (Table 8)—Among hypertensives, 45·4 per cent had an abrupt, 43 per cent a rapid and 11·9 per cent a gradual onset. In the atherosclerotic group, out of 15 cases, 5 had abrupt, 7 rapid and 3 gradual onset. In cases with syphilis, 2 had a gradual, 2 rapid and only one an abrupt onset. All the 3 cases with cardiovalvular disease were abrupt in onset and so were the cases with subarachnoid haemorrhage and those who had the background of myocardial infarction.

TABLE 8—SHOWING MODE OF ONSET AS RELATED TO BACKGROUND FACTORS IN THE 108 CASES OF THE WILLINGDON HOSPITAL

Backgrounnd factors	MODES OF ONSET		
	Abrupt (46 cases)	Rapid (44 cases)	Gradual (18 cases)
Hypertension (42 cases)	19 (*45·4*)	18 (*42·8*)	5 (*11·9*)
Diabetes without hypertension (30 cases)	7 (*18·9*)	16 (*43·2*)	7 (*18·9*)
Diabetes with hypertension (6 cases)	5 (*13·5*)	—	1 (*2·7*)
Atherosclerosis (15 cases)	5 (*33·0*)	7 (*46·2*)	3 (*19·8*)
Syphilis (5 cases)	1 (*20·0*)	2 (*40·0*)	2 (*40·0*)
Post-delivery (4 cases)	3 (*75·0*)	1 (*25·0*)	—
Cardiovalvular disease (3 cases)	3 (*100·0*)	—	—
Subarachnoid haemorrhage (2 cases)	2 (*100·0*)	—	—
Myocardial infarction (1 case)	1 (*100·0*)	—	

Italicised figures in parentheses indicate percentages.

TABLE 9—SHOWING FOCAL LOCALISATION* IN THE 108 CASES OF THE WILLINGDON HOSPITAL

Focal localisation	No. of cases
Middle cerebral artery	105 (*97·5*)
Anterior cerebral artery	nil
Posterior cerebral artery	nil
Posterior inferior cerebellar artery ...	nil
Subarachnoid haemorrhage	2 (*1·84*)
Cavernous sinus thrombosis ...	1 (*0·92*)

* Records on localisation are incomplete.
Italicised figures in parentheses indicate percentages.

Focal localisation—Records of focal localisation are not very complete (Table 9). There was one case of cavernous sinus thrombosis. In the Irwin Hospital series there were two cases which were diagnosed as basilar artery occlusion. There were 105 cases (97·5 per cent) of middle cerebral artery lesion. Subarachnoid haemorrhage occurred in 2 cases (18·4 per cent).

Clinical features—Tables 10 and 11 show the incidence of clinical features in 108 cases studied in detail and their relationship to background factors.

Incidence of deep coma was maximum with hypertensive cases (46·0 per cent). 16 cases had no impairment of consciousness. The one case of basilar artery occlusion showed decerebrate type of fits. Speech disturbance in one form or the other was present in 59 cases. Three patients showed generalised convulsions. Ocular phenomena were observed in 9 cases. Eight cases had monoplegias.

Twenty-five cases had no localising signs, but lumbar puncture showed blood in C.S.F. in 15 cases. 44 cases had right-sided hemiplegia and 23 left-sided. 8 cases had only hemiparesis. Facial paralysis was quite commonly encountered.

Sensory disturbances were recorded in 18 cases and another 18 cases had sphincteric disturbances. Three patients developed pneumonia as a complication.

Incidence of hemiplegia in relation to the side affected was R : L : : 23 : 17. Six patients had convulsions, 32 were comatose and 6 had urinary incontinence. 5 cases had pulmonary oedema. 11 had aphasia and other speech disturbances (Banerjea and Maity, *loc. cit.*).

In Khan and Rao's series, incidence of right and left-sided hemiplegia was almost equal. Our figures seem to tally with those of Bannerjea, in showing greater incidence of right-sided hemiplegia. In Khan's series, 54 per cent cases were comatose.

Treatment adopted—Table 12 shows the treatment adopted in 108 cases of this series. Eighty-one cases were given vasodilators like nicotinic acid and priscol or both. 2 cases were put on anticoagulants. No suprathoracic block was given. 25 cases had only general nursing care.

Results of therapy in relation to background factors (Table 13)—Twenty cases in this series expired. Mortality was 100 per cent in intracere-

TABLE 10—SHOWING INCIDENCE OF CLINICAL MANIFESTATIONS IN RELATION TO THE BACKGROUND FACTORS (PART A) IN THE 108 CASES OF THE WILLINGDON HOSPITAL

Background factors	CLINICAL MANIFESTATIONS								
	Coma	Semicoma	Disorientation	Loss of memory and confusion	No loss of consciousness	Aphasia	Dysarthria	Convulsions	Ocular phenomena
Hypertension ...	20 (46·0)	6 (13·8)	6 (13·8)	5 (21·5)	5 (21·5)	18 (41·6)	9 (20·7)	1 (2·3)	4 (9·2)
Diabetes without hypertension	11 (29·7)	3 (8·1)	3 (8·1)	3 (8·1)	10 (27·0)	10 (27·0)	8 (21·6)	—	1 (2·7)
Diabetes with hypertension	4 (10·8)	2 (5·4)	—	—	—	6 (16·2)	—	—	1 (2·7)
Atherosclerosis ...	2 (13·2)	4 (26·4)	3 (19·8)	6 (39·6)	—	1 (6·6)	1 (6·6)	1 (6·6)	2 (13·2)
Syphilis	—	2 (40·0)	1 (20·0)	1 (20·0)	1 (20·0)	2 (40·0)	1 (20·0)	1 (20·0)	—
Post-delivery ...	—	3 (75·0)	1 (25·0)	—	—	—	—	—	—
Cardiovalvular disease	—	2 (66·6)	—	1 (33·3)	—	2 (66·6)	1 (33·3)	—	—
Subarachnoid haemorrhage	2 (100·0)	—	—	—	—	—	—	—	—
Myocardial infarction .	—	1 (100·0)	—	—	—	—	—	—	—

Italicised figures in parentheses indicate percentages.

TABLE 11—SHOWING INCIDENCE OF CLINICAL MANIFESTATIONS IN RELATION TO BACKGROUND FACTORS (PART B) IN THE 108 CASES OF THE WILLINGDON HOSPITAL

Background factors	CLINICAL MANIFESTATIONS								
	With blood in C.S.F.	Without blood in C.S.F.	Monoplegia	Hemiplegia		Facial paralysis / Paresis		Sensory disturbance	Sphincter involvement
				Right	Left				
Hypertension* ...	10 (23·0)	6 (13·8)	4 (9·2)	10 (23·0)	8 (18·4)	26 (59·8)	4 (9·2)	6 (13·8)	8 (18·4)
Diabetes mellitus** ...	5 (13·5)	2 (5·4)	3 (8·1)	15 (40·5)	9 (24·3)	20 (54·0)	2 (5·5)	10 (27·0)	6 (16·2)
Atherosclerosis ...	—	—	1 (6·6)	9 (58·4)	4 (26·4)	—	1 (6·6)	—	—
Syphilis ...	—	—	—	3 (60·0)	1 (20·0)	2 (40·0)	1 (20·0)	2 (40·0)	1 (20·0)
Post-delivery ...	—	—	—	4 (100·0)	—	1 (25·0)	—	—	1 (25·0)
Cardiovalvular disease	—	—	—	2 (66·6)	1 (33·3)	2 (66·6)	—	—	2 (66·6)
Subarachnoid haemorrhage	—	2 (100·0)	—	—	—	—	—	—	—
Myocardial infarction ...	—	—	—	1 (100·0)	—	—	—	—	—

Italicised figures in parentheses indicate percentages.

* The complications were pneumonia in 2 cases (4·6%) and uraemia in 1 case (2·3%).

** The complications were pneumonia in 1 case (2·7%), diabetic coma in 2 cases (5·4%) and uraemia in 1 case (2·7%).

TABLE 12—SHOWING TREATMENT GIVEN TO THE 108 CASES OF THE WILLINGDON HOSPITAL

TREATMENT GIVEN			
General	Vasodilators : Nicotinic acid, priscol	Anti-coagulants	Only general nursing care
108 cases (*100·0*)	81 cases (*74·52*)	2 cases (*1·84*)	25 cases (*20·8*)

Italicised figures in parentheses indicate percentages.

bral haemorrhage. Both the cases of subarachnoid haemorrhage survived with residual eye signs. All the cases with embolic episodes survived, and had complete recovery in the hospital. 5 patients with syphilis were discharged with residual hemiplegia.

Mortality was very high in cases with coma and those who had convulsions. Mortality was higher in hypertensive cases, either alone or with diabetes mellitus. The same was true for patients in the older age-group and those who had complications like pneumonia, uraemia or sphincteric disturbances.

SUMMARY

A statistical study of 476 cases of cerebrovascular strokes at Delhi is reported, with detailed analysis of 108 cases. The relationship of its incidence to total admissions, total medical admissions in the period, age, sex, occupation, socio-economic status and relative incidence of the various background factors in this series have been worked out.

The type of lesion and the frequency with which each type occurred have been reviewed and salient clinical features in relation to the background factors recorded.

The response to treatment and certain important factors which may effect the prognosis have been commented upon.

A comparison has been made with the literature, particularly Indian, available on the subject.

TABLE 13—SHOWING RESULTS OF THERAPY IN RELATION TO BACKGROUND FACTORS IN THE 108 CASES OF THE WILLINGDON HOSPITAL

Background factors	RESULTS OF THERAPY					
	Residual hemiparesis	Residual hemiplegia	Residual aphasia	Residual eye signs	Completely recovered	Expired
Hypertension (42 cases) ...	25 (*59·5*)	2 (*4·7*)	3 (*7·1*)	—	3 (*7·1*)	9 (*21·4*)
Diabetes mellitus without hypertension (30 cases)	17 (*56·6*)	5 (*16·6*)	2 (*6·6*)	—	2 (*6·6*)	4 (*13·3*)
Diabetes mellitus with hypertension ,6 cases)	—	—	—	—	2 (*33·3*)	4 (*66·6*)
Atherosclerosis (15 cases) ...	5 (*33·3*)	7 (*46·6*)	—	—	1 (*6·6*)	2 (*13·3*)
Syphilis (5 cases) ...	—	5 (*100·0*)	—	—	—	—
Post-delivery (4 cases) ...	1 (*25*)	1 (*25*)	—	—	—	2 (*50*)
Cardiovalvular disease (3 cases)	2 (*66·6*)	1 (*33·3*)	—	—	—	—
Subarachnoid haemorrhage (2 cases)	—	—	—	2 (*100·0*)	—	—
Myocardial infarction (1 case)	—	1 (*100·0*)	—	—	—	—

Italicised figures in parentheses indicate percentages.

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LYMPH GLAND BIOPSY IN THE DIAGNOSIS OF OSTEOARTICULAR TUBERCULOSIS

A Preliminary Report

B. N. SINHA, F.R.C.S., F.I.C.S.

M. K. GOEL, M.S.

AND

G. K. VISHWAKARMA, M.B.B.S.

Department of Orthopaedic Surgery
King George's Medical College, Lucknow

The diagnosis in early cases of osteo-articular tuberculosis is a challenge to the orthopaedic surgeon. The importance of all the ancillary methods with a view to establish an early diagnosis needs no emphasis. This is because of the spectacular success achieved in treating such patients early and the inevitable permanent crippledom to which they are destined if diagnosis is delayed. The incidence of osteo-articular tuberculosis is quite high in this country and any method of early diagnosis is worthwhile. In most of the cases all the available evidences, short of arthrotmy, are insufficient to establish the diagnosis. In early cases patients complain of joint pain only or slight limp ; physical signs are minimum and x-ray findings are negative or inconclusive. The E.S.R. is usually but not invariably raised and the test is not specific as it is raised in many other conditions. Some surgeons prefer to wait for further physical signs to appear, while others institute the anti-tuberculous treatment immediately ; but both the methods are unsatisfactory and may even be harmful. The exploration of the joint should be regarded as a last resort. This involves the opening of the larger joints which in itself is technically difficult and hazardous and the result not always decisive. Due to all these difficulties in arriving at a correct diagnosis, a study of regional lymph gland biopsy was undertaken and its role in arriving at a diagnosis assessed. The biopsy of lymph gland is a safer and simpler procedure. If in a patient with arthritis in whom positive tuberculous focus is present in the regional lymph gland it appears reasonable to presume that the lesion in the joint is of the same nature. This has been confirmed by several workers from India and abroad.

The purpose of this study is to find out the proportion of positive lymph gland biopsy in definitely proved cases of osteo-articular tuberculosis and to establish its usefulness and accuracy in the early diagnosis of the disease.

METHOD AND MATERIAL

An histological study of 93 lymph glands was carried out in 86 cases in the department of orthopaedic surgery at the G. M. & Associated Hospitals, Lucknow. Cases for study were broadly divided into the following groups :

1. Cases of established osteo-articular tuberculosis, proved clinically and radiologically. In this group there were 62 cases.

2. Early cases of osteo-articular tuberculosis in whom radiological findings were negative or inconclusive. In this group there were 24 cases.

In all these cases detailed clinical, radiological and haematological examinations were also done. In 15 cases materials from the lesions were taken and sent for histological examination.

In this series regional lymph glands were removed in 11 cases for lesions of the hip and ilium. In 47 cases inguinal lymph glands were removed for lesions of the hip, knee and ankle. Popliteal gland was removed in 7 cases for lesions of the ankle and foot ; and axillary lymph gland was removed in 13 cases for lesions of the shoulder, elbow and wrist ; epitrochlear gland was removed in 15 cases for lesions of the elbow, wrist, ulna, radius and phalanges (Table 1).

All the glands were removed under local anaesthesia except in children and nervous patients in whom general anaesthesia was used. General anaesthesia was also used for removal of axillary and external iliac group of glands. In all the cases at least one intact node but preferably two or three were removed. Care was taken to avoid any trauma to the gland as far as practicable. Before closing the wound streptomycin powder was instilled locally. In only two cases

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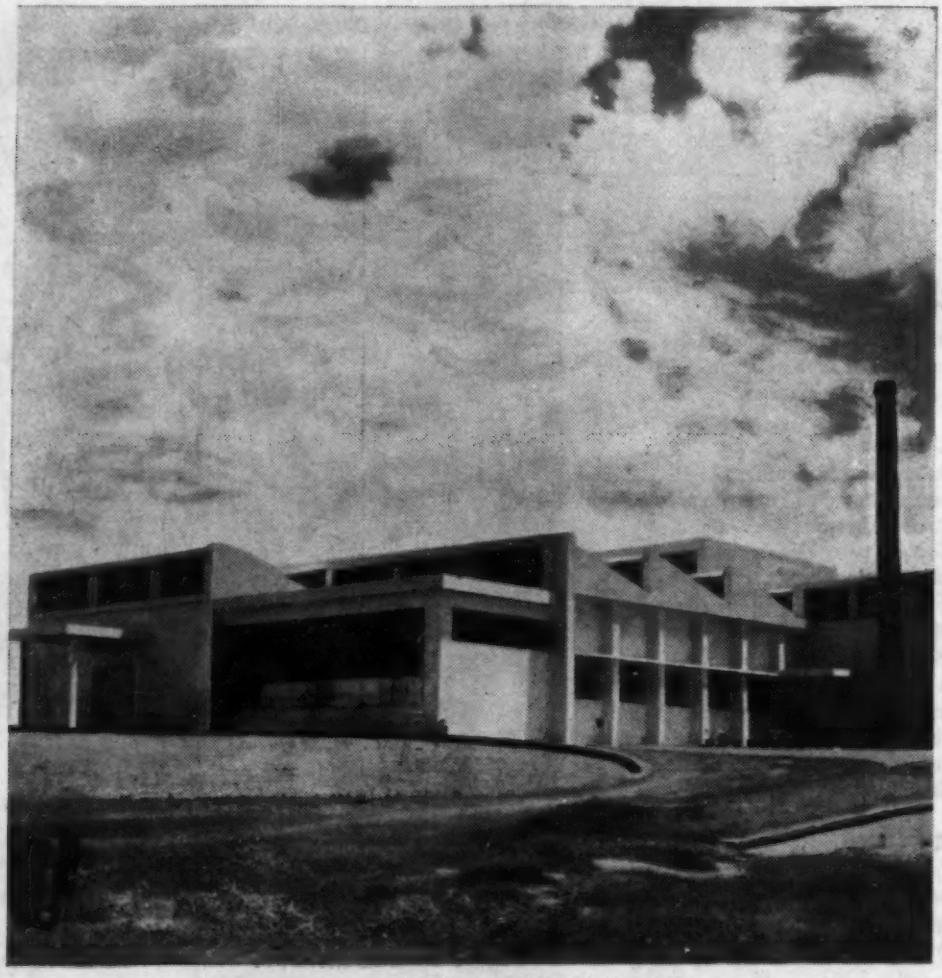

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TABLE 1—SHOWING NO. OF CASES IN WHICH REGIONAL LYMPH GLANDS WERE REMOVED AND THE RESPECTIVE SITES OF LESION

Glands removed	Total No. of cases	Sites of lesion	No. of cases
Ext. Iliac ...	11	Hip	8
		Ilium	3
Inguinal ...	47	Upper end of femur	1
		Hip	10
		Knee	15
		Ankle	21
Popliteal ...	7	Ankle and foot	7
Axillary ...	13	Shoulder	4
		Elbow	5
		Wrist	4
Epitrochlear	15	Elbow	6
		Wrist	4
		Radius	1
		Ulna	1
		Phalanx	3
	93		93

local infection occurred which healed up in a week's time by local streptomycin dressing alone. The glands so removed were sectioned into two, fixed in 10 per cent normal saline and sent to the department of pathology. All the positive sections revealed well formed tubercles consisting of epithelioid cells, fibroblasts and Langhan's giant cells with or without caseation.

Guineapig inoculation, cultural examination and staining of the slides for A.F.B. were not done. It was felt that a characteristic histological picture is sufficient for the diagnosis.

RESULTS

In this series of 86 cases, 93 glands were removed ; out of these, 3 glands were removed from patients in whom diagnosis of tuberculous joint could not be made. In 6 cases the selection of gland was wrong. Of the remaining 84 glands, 63 were positive for tuberculosis (75 per cent). This figure compares favourably with those of the previous workers.

The youngest patient was 3 years old and the oldest 35 years of age.

In the age-group below 10 years, biopsy was positive in 13 out of 22 cases (59 per cent) ; in the age-group 10-21 years it was positive in 23 out of 34 cases (67·6 per cent) ; and in the age-group above 21 years it was positive in 23 out of 34 cases (67·6 per cent).

In advanced cases in whom skiagram showed definite changes, viz., diminution of the joint space or destruction of the joint, biopsy was positive in 47 out of 62 cases (75·8 per cent). In early cases which were clinically suspected with none or very little radiological findings, biopsy was positive in 16 out of 24 cases (66·6 per cent). In patients coming within 3 months of the onset, biopsy was positive in 11 out of 16 cases (68·7 per cent).

Table 2 shows the sites affected, the glands examined and the results of biopsy.

Table 3 shows the results of gland biopsy in cases where the x-ray findings were negative or inconclusive.

The following observations were made :

1. Lymph gland biopsy revealed tubercles in 75 per cent of proved cases of osteo-articular tuberculosis.

2. Lymph gland biopsy gave better results in patients over 21 years of age, 23 being positive out of 30 glands (76·6 per cent).

3. In 35 cases in whom sinuses were present, 26 glands were positive (74·3 per cent).

TABLE 2—SHOWING THE SITES AFFECTED, GLANDS EXAMINED AND RESULTS OF BIOPSY

Site & No. of cases	Gland examined	No. of cases	No. of cases with positive biopsy
Hip (14) ...	(a) Ext. iliac	8	6
	(b) Inguinal	10	4
	(c) Both	4	
	Both positive in 3, both negative in 1		
Knee (15) ...	Inguinal	15	11
Ankle (25) ...	(a) Inguinal	21	10
	(b) Popliteal	7	4
	(c) Both	3	
	Both positive in 1, both negative in 3		
Shoulder (4) ...	Axillary	4	4
Elbow (11) ...	(a) Axillary	5	5
	(b) Epitrochlear	6	5
Wrist (8) ...	(a) Epitrochlear	4	3
	(b) Axillary	4	4
Upper end of femur (1)	Inguinal (Not tubercular)	1	—
Ilium (3) ...	Ext. iliac	3	3
Ulna (1) ...	Epitrochlear	1	1
Radius (1) ...	Epitrochlear	1	1
Finger (3) ...	Epitrochlear	3	2

N.B.—Under 'Miscellaneous' sites the no. of cases was 5.

HORLICKS

TABLE 3—SHOWING RESULTS OF GLAND BIOPSY IN CASES WHERE X-RAY FINDINGS WERE NEGATIVE OR INCONCLUSIVE

Site & No. of cases	Gland examined	No. of cases	No. of cases with positive biopsy
Hip (5) ...	(a) Ext. iliac	4	3
	(b) Inguinal	1	0
Knee (8) ...	Inguinal	8	5
Ankle (7) ...	(a) Inguinal	5	3
	(b) Popliteal	2	1
Elbow (3) ...	(a) Axillary	1	1
	(b) Epitrochlear	2	2
Ilium (1) ...	Ext. iliac	1	1

4. 62 cases of advanced osteo-articular tuberculosis in whom there were definite radiological findings, lymph gland biopsy was positive in 42 cases (67·7 per cent).

5. Out of 24 clinically suspected cases lymph gland biopsy was positive in 16 cases (66·6 per cent).

6. Out of 16 cases encountered within 3 months of the onset of the disease, lymph gland biopsy was positive in 11 cases (68·7 per cent).

DISCUSSION

In this study of lymph gland biopsy the percentage of positive result was much higher in the lesions of the upper extremities than in those of the lower. In the upper limbs 35 were positive against 56 in the lower. These findings deserve closer attention. It is possible that one of the reasons for this difference could be the unsatisfactory selection of lymph glands for the lesions of the ankle and foot. It appears that further studies on the lymphatic drainage of the ankle and foot should be carried out. Presumably the infection had better access to the popliteal lymph glands and did not travel further up to reach the inguinal group of glands in most of the cases. The removal of popliteal lymph gland is a technically difficult procedure. The deep lymphatics of the ankle and foot reach the inguinal lymph glands along the arteries and most of them have to pass through the popliteal glands. It is not possible to offer any satisfactory explanation till further work is done on this aspect of the problem. In 15 cases histological study was made of the materials removed during the operations on the affected joints. In 2 cases the findings were significant. In one case suffering from tuberculosis of the hip with abscess, in whom synovectomy was done, the gland and synovial membrane were both positive but the granulation tissue was found to be negative for tuberculosis. In the other, a case of tuberculosis of the ankle with sinus, in whom an excision and arthrodesis were performed, the curetted material was found to be negative on histological examination, while the biopsy from the inguinal gland was positive. These findings tend to show that arthrotomy and histological examination of the materials from the joint are not necessarily reliable diagnostically. However, absolute precaution should be taken in collecting the appropriate material for such studies. In one out of these 15 cases though the synovial membrane was positive, the gland biopsy proved negative for tuberculosis. In the remaining cases both gland biopsy and materials from the joint were positive.

A negative histological finding in regional gland biopsy cannot rule out tuberculous disease of the corresponding joint. A negative result may also be obtained under the following conditions:

1. Wrong selection of gland for biopsy.
2. The bacilli might not have been carried to the gland.
3. Section of the gland away from the site of the lesion inside
4. Bacilli in the gland might not have time to excite a cellular reaction.

A positive result is of the greatest possible value. Positive result may also be obtained if the patient has any focus of extra-osseous tuberculous lesion, especially in the area drained by the gland removed for biopsy and thus the cases should be thoroughly examined for any such focus. In this series there was no case of extra-osseous tuberculosis.

CONCLUSIONS

1. Lymph gland biopsy is a useful method of diagnosis of osteo-articular tuberculosis which yields about 75 per cent positive results. This procedure may very greatly reduce the degree of uncertainty in diagnosis. Thus the need for joint biopsy, which in itself is not an entirely reliable diagnostic aid and is technically difficult and hazardous, may be considerably reduced.

2. In the superior extremity results of gland biopsy for osteo-articular tuberculosis are gratifying.

3. Results of gland biopsy for the lesions of the ankle and foot are not encouraging.

4. It is felt that axillary glands should be removed for lesions of the shoulder, elbow and wrist. Epitrochlear gland whenever palpable should be removed for lesions of the elbow, wrist and hand.

External iliac group of glands should be removed for lesions of the hip and ilium. Inguinal gland biopsy has no place in the diagnosis of lesions of the hip unless sinuses are present. Inguinal glands should be removed for lesions of the knee, ankle and foot.

Popliteal gland when palpable should be removed for lesions of the ankle and foot.

5. Negative histological findings in regional lymph glands do not necessarily exclude the possibility of osteo-articular tuberculosis.

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PRACTITIONERS' SERIES

INFANTILE ECZEMA AND ITS MANAGEMENT

B. N. BANERJEE, M.B., F.R.C.P.

Professor of Medicine, Medical College
Head of the Department of Dermatology
University College of Medicine
Calcutta

Infantile eczema, one of the commonest dermatological problems in paediatric practice, is indeed so common that there would hardly be a physician in general practice, who has not come across such patients in some form or other. The intelligent well-built and sturdy infants with blooming faces studded with erythematous papules on both cheeks, are a common scene in any dermatologic out-patient's department. The most remarkable part of the sight is the playful attitude of these suffering infants, who are unconcerned about their skin condition as compared to the anxious looks of their mothers and other relatives.

Infantile eczema, though widely popular as an epithet, is a misnomer. It does not mean, as it should literally, the eczematous conditions in infancy, i.e., up to the age of 2 years. Hill, a paediatrician as well as director of eczema clinic at Boston, differentiated it with other conditions in infants, which may some time or other become eczematous and simulate the so-called 'true infantile eczema'. However, the author has found it beneficial both from the diagnosis and therapeutic points of view, to classify the eczema in infants in two broad groups. The first group contains the single entity clinically called infantile eczema, and is purely an atopic condition. The second group, which the author would like to call secondary eczema in infants, includes the various skin manifestations at this age, which are liable to present themselves clinically as so-called 'true infantile eczema' at some stage of their development. Seborrhoeic dermatitis, allergic eczematous contact dermatitis, infectious eczematoid dermatitis and eczematoid scabies, the common clinical entities seen in this part of the country, are included in the second group. Not infrequently, one may come across eczematoid fungus infections especially monilial infections and rarely the clinical condition called erythrodermia desquamativa (Leiner's disease) which is perhaps a variant of seborrhoeic dermatitis, extensive in nature. It is always advantageous to exclude diseases of the second group. By this the cases can be properly managed and one can predict the therapeutic prognosis with greater accuracy.

Infantile eczema is again subdivided by some on aetiological basis into two varieties, viz., allergic and atopic. They differrentiated the allergic type of infantile eczema by its sudden occurrence, as early as the child starts weaning, and they claim that this variety is due to sensitisation to some ingredient of milk, possibly lactalbumen, and in these cases the family history of any other atopic condition is invariably lacking. However, such a classification instead of being of any help, confuses the issue more. There is no clear-cut demarcation, the exclusion of so-called offending diet may not help at all and sensitivity tests like patch tests with these offending food items are often erratic.

The clinical picture of atopic dermatitis in infants (so-called 'true infantile eczema') in typical instances is so stereotyped that the general diagnosis presents hardly any difficulty. The otherwise healthy baby beginning to show erythema and papulation progressing to a reddish, oozing appearance on both cheeks are the usual early signs seen, after a healthy period of two months. The lesions spread down from cheeks to the other areas of the body, and the seat of predilection is the face including the forehead and chin, scattered areas of the trunk, buttocks and the rest of the extremities. Not infrequently, in this part of the country, lesions have been observ-

ed originating from the extremities and then spreading up towards the face assuming the true picture of infantile eczema. The child continues to suffer with an unpredictable wax and wane up to the age of two years, after which he spontaneously gets cured or even if the lesions tend to persist they are milder in nature. However, some of the infants are liable to suffer another phase of atopic manifestations, clinically a somewhat different condition called Besnier's prurigo.

Intense pruritus leading to excoriation is the predominating symptom throughout the course of the disease. Commonly secondary infection supervenes, increasing the acuteness of the malady and may be leading to general impetiginisation. However, by far the worst complication is the secondary invasion of herpes simplex or vaccinia virus. Smallpox vaccination in these children is to be scrupulously avoided during the period of active disease. These children are very prone to anaphylactic reactions and fatal results have been recorded by injudicious serum therapy or blood transfusion.

In differential diagnosis the other eczematous conditions of infanthood, viz., seborrhoeic dermatitis in infants and allergic eczematous contact dermatitis, are very important as these are the conditions liable to be very often confused with the true infantile eczema. The criteria of differential diagnosis have been shown in Table 1. Infectious eczematoid dermatitis, the so-called streptococcal dermatitis, is another variant of the eczematous conditions in infants and is liable to be confused with infantile eczema, more so in this part of the country due to its frequent occurrence either alone or in combination. It originates from the intertreginous parts of the body, usually from behind the ears and then extends to the contiguous regions. Its true inflammatory character with ample serosanguinous discharge form the basis of a correct diagnosis. Moreover, when on extremities, the perifollicular localisation is very prominent and an important diagnostic feature. Eczematoid scabies, with particular localisations very different from the infantile eczema, and almost always excluding the face, rarely presents a diagnostic problem. A careful history and a thorough clinical examination will invariably reveal concomitant lesions on the person of the other members of the family including the mother and the nurse. Rarely monilial infection, dermatitis herpetiformis and some drug eruptions will come into the picture, though they hardly present the true clinical features of infantile eczema.

Therapy and Management

Up to recent years, effective treatment of atopic dermatitis was largely topical and while such treatment always was burdensome, it is still good and necessary. The advent of antihista-

Table 1—Showing Criteria for Differentiating Eczematous Conditions of Infancy

Diagnostic criteria	Infantile eczema	Seborrhoeic dermatitis	Allergic eczematous contact dermatitis
Age of onset	Usually 2 months after birth	Any time, even at birth	Any time after 2-3 weeks
Familial history of atopy ...	Positive, i.e., abnormally high incidence	Negative, i.e., of normal incidence	Negative, i.e., of normal incidence
General incidence ...	Common	Less common	Least common
General appearance of the unaffected skin	Often dry, with tendency to follicular keratosis	Often normal in appearance, in some cases tendency to greasy and/or oily skin	Usually normal
Principal skin and systemic signs and symptoms	Starts from face; erythematous oozing and crusting; constitutional symptoms usually none	Usually starts with cradle cap; erythematous and greasy scaling; no constitutional disturbance	No particular site to start with; erythematous, papulovesicles, bullae, oozing and crusts; no constitutional disturbance
Site of predilection ...	Face and flexures	Scalp, ears and intertreginous areas	No particular site
Course and prognosis ...	Protracted for at least 2 years	Usually good	Depend on exclusion of sensitising agent
Response to therapy ...	Slow but good; relapses common	Fairly rapid; relapses less common	Depends on exclusion of sensitising agent; general response rapid

minics aroused new hopes both for systemic and topical uses. But they have belied the early hopes, and are of no greater value than for reasonably good sedation or partial control of pruritus. Moreover, the topical antihistaminics are highly sensitising and in current years have been largely replaced by steroids. The traditional remedies are unreplaced to this day and they still form the basis of therapy in infantile eczema.

In the oozing stage of the condition, aim should be (1) to control secondary infection, if any, (2) to control oozing and to remove crusts. Both the purposes can be served by spaced wet dressing and frequent application of lotions and emulsions, ointments being avoided scrupulously. A wet dressing of potassium permanganate (1 : 60,000) every 4 hours or Goulard's lotion compress at short intervals is very soothing and effective at this stage. Following this, lotio or emulsio calamine with menthol and phenol (each ½ per cent), generously painted after each dressing, is indicated. The scratching by child should not be allowed and this will be best achieved by rendering the lesions non-pruritic by frequent repetitions of the above treatment. A sedation at night with benadryl or pyribenzamine (elixir, 10-20 mg.) is indicated to ensure good sleep. Usually the antibiotics are not to be used locally to control secondary infection. In some advanced cases, however, preparations containing bacitracin and/or gramicidin can be effectively used without much risk of sensitisation.

After the oozing stage has subsided, the wet dressing should be stopped as soon as the lesions appear to be perfectly dry. Now there is need of more stimulating treatment which can be judiciously given in ointment or paste forms. Hydrocortisone is the drug of choice at this stage, though it can be effectively combined with an ointment containing coal tar (liquor carbonis detergens 2-5 per cent in unguentum aqua rosae) and this combination appears to give better therapeutic results. Menthol (½ to ¾ per cent) and phenol (¾ to 1 per cent) can be given with advantage, to relieve pruritus. Usually this schedule of treatment will be sufficient for a clinical cure at this stage in the majority of cases, and treatment should be continued till the last sign of the disease process has disappeared.

It is, however, impossible to predict the oncoming relapse, and it is always advantageous to advise the parents to bring the child for treatment, at the first appearance of any sign of the disease. Early stages of the disease can be effectively controlled by judicious use of ointments containing hydrocortisone or coal tar and/or vioform in acceptable base. After the child has attained the age of two years, there is every likelihood of spontaneous cure, or if the child be unfortunate, the attacks may come in a milder form later, localising the disease process to the other atopic skin conditions e.g. Besiner's prurigo.

Oral steroid therapy, a very useful adjuvant in the treatment of infantile eczema, should never be used indiscriminately. It should be reserved for the severe cases or where complete remission is not achieved by the usual topical therapy. Considering all the hazards of cortisone therapy, which are less seen now due to the advent of newer analogues, a dose of 50 to 75 mg. (or its equivalent if newer analogues are used) daily can be administered with safety over a long period, if necessary. Of course, the possibility of promoting pyogenic infection or increasing infectivity with tubercle bacilli and other infectious microorganism, upsetting electrolyte balance and creating 'moon-facies' or other marks of Cushing's syndrome, should be borne in mind and regularly sought and tested for. With all hazards considered and precautions taken, cortisone therapy will prove of great benefit with little real danger.

The role of diet in infantile eczema is, more or less, in a stage of complete confusion due to diverse and often contradictory views held by different workers of the globe. As a matter of fact, the course of atopic dermatitis in infants is so variable in its exacerbation and partial remission that it is not possible to state definitely whether giving or withdrawal of a food or certain foods worsenes or betters the condition. In clinical practice the author, however, always found it advantageous to avoid milk especially cow's milk during the acute phase of the malady. At this stage, a dose of hydrarg. cum creta (Gray powder, children dose) to clear the bowels is, at times, followed by good clinical results. In any case, too much stress should not be laid on the dietotherapy and, it is better to try to control the cutaneous process by every other means while the average dietary is allowed. Any item of food may be withdrawn only if there is a definite indication of its association with the clinical relapse of the disease.

To attach too much importance to psychosomatic factors in the management of infantile eczema is one of those intricacies of dermatology which has never convinced the author much. According to him psychosomatic factors alone, if at all, cannot alter the course of infantile eczema. It is, however, always advisable to keep the child in a cheerful mood as far possible, and his mind should be distracted from the disease by providing both symptomatic relief as well as ample provision for diversion.

In the end, it can be well emphasised that though remissions are frequent, the general management of infantile eczema is not very difficult. Practically all cases can be kept in a controlled state, with the treatment outlined above. Many other methods of therapy have been advised by different workers which can be well combined or followed as a separate schedule, with advantage. In any case the main principle of therapy remains the same. There is nothing to be disheartened about the treatment of this common atopic manifestation of childhood and quite a good percentage of cases will never show any further manifestations of atopy like eczema of adulthood or asthma or hay fever and live a pleasant and healthy life with due credit to the treating physician.

SPECIAL ARTICLES

A STUDY OF MALE STERILISATION AT KANPUR

Report on 202 Cases of Vasectomy

T. P. BANERJI

Medical Officer-in-charge, U. M. H. Hospital Kanpur

MATERIAL AND METHOD

Out of 274 subjects of male sterilisation 202 have been taken up for study. Every male desiring voluntary sterilisation was subjected to a very close screening to find out the stability of his personality, the extent and depth of his sex education, and the degree and intensity of his desire to get sterilised. Subjects who were nervous in temperament and uncertain about sex implications and having any fear were not advised to undergo operation till such times as they became stabilised in personality. A very useful precedure was to recommend them a scientific book on sex facts, and many came back as stable personalities after self education in sex science, needing only some clarification in two or three sittings on the average.

Motive for sterilisation—198 out of 202 subjects had the operation performed because the couple had as many children as they wanted or could care for adequately. 4 amongst 202 wanted vasectomy performed due to physical disability of their wives —3 were for constitutional diseases of the wives and one due to insistence of the wife to remain nulliparous.

Approach to patients—The intending subjects usually come to elicit information for some alleged second person. Most common fear expressed was about the possibility of impotency. They made enquiries about orgasm and the 'climax'. They feared about the 'secretions'. Some of them desired to know whether their female partners would not be affected by the absence of 'secretion'. 61 wives accompanied their husbands in the first consultation. Fear of sex difficulties could not be dispelled in 8 wives who prevented their husbands from undergoing the operation and offered themselves in lieu and got themselves operated. Other couples who came together with their husbands for consultation regarding operative 'family limitation' in the male, never appeared again before the author. The total number of such consultations during the relevant period was 407.

Operation—An incision, 2 cm. long, is made on the median raphe, 3 cm. below the scrotopenile junction, after initially infiltrating the skin 6 cm. all round with 1 per cent lignocaine. One ml. of this solution is injected in each cord near the external inguinal ring. The vas deferens is projected digitally under the incision and underpinned with a round-body curved needle entering the scrotal section lateral to the incised area and coming out of the incised space. The cord is freed of its coverings by dissection with two sharp straight needles, while an assistant holds the underpin—the spermatic artery is separated, and a 2 cm. segment of cord between ligatures is resected. The wound is closed with one or two skin stitches, and sealed with collodion. Absence of dressing gives the patient a sense of security and an assurance that nothing important has been destroyed. All patients receive for 2 days oral antibiotic cover and prophylactic ATS injections.

Results—Of the 202 cases seven needed hospitalisation. In six patients the operation was done while they were being operated on for hydrocele. One had to be hospitalised because of extreme nervousness. 27 cases complained of some discomfort in joining their normal duties within a week. 186 cases took advantage of a Sunday and were back to work on Monday.

Effect on libido—8 persons out of 202 reported change in their libido and diminution in sex desire following the operation. 2 cases were unable to perform the sexual act after 18 months of operation. 5 more were dissatisfied and complained of diminution of sexual power. Duration of sexual act remained unchanged in 108. 79 cases reported marked increase of sexual efficiency after operation, which may be due to pre-operative psychological education on which the author

insisted to give sufficient time. There was no physiological alteration in hormonal output because the interstitial cells always persisted and continued to release their hormone despite sterility.

A pre-operative discussion with the patient is of vital importance and each surgeon may have his own brand of 'pep talk'. This produces lasting effect on the patient's psychology.

Postoperative discomfort—Headache and slight rise of temperature for a day or two were usual. There was difficulty in working freely within 2 days in 150 out of 202 subjects. Difficulty in cycling after 7 to 14 days was observed in 50 per cent, 2 persisted to have it for 4 months. Early pain in one or both cords during erection was the most common complaint. The minimum time for this symptom to disappear was about 5 days (maximum 16 months, average 2 weeks). Formation of nodules in the cord was seen in 37 cases—bilateral in 4, unilateral in 33. The nodule was on the testicular end in 28, on the inguinal in 9. The largest node was of the size of an egg which on aspiration showed active normal, spermatozoa. It had to be excised later as the patient had post-coital pain which was severe in nature. Alteration in sexual efficiency occurred in 94 cases—increased in 79 and diminished in 15. The average time lost from work was less than 3 days. It is notable that many, including a few truck drivers and several mechanics, were able to resume work the same day. In all, 48 reported discomfort, i.e. beyond 14 days.

Objective changes—No change in external appearance or sexual characteristics, e.g., pitch of voice or distribution of hair, were observed or reported by the patients. All cases were advised to get their seminal fluid examined for spermatozoa for the next six weeks following the operation. In 155 cases the maximum period when spermatozoa were seen in the fluid was 56 days after operation. The minimum period of total absence of spermatozoa was 16 days after operation.

One out of 202 operated cases reported an undesired pregnancy in his wife after 14 months from operation. His discharge failed to show any spermatozoa on 5 different dates. His wife demanded evacuation, but the existing laws stood against this being done.

Two of the cases who showed change in libido were very actively depressed even after a lapse of one to 1½ years, despite assurance. 92·5 per cent, i.e., 187 out of 202 cases were well pleased with the result of the operation. We may add to this 72 cases done in the well educated class before 19-9-59, who are still pleased with the operative results. The position can be summarised thus: The presumption that vasectomy results in the average case in no change in sexual activity or sexual capacity is supported by 96 per cent of cases. The changes in either libido or frequency of intercourse by 4 per cent appeared to be chiefly of psychological origin. The surgeon should, therefore, avoid all cases who have unsuitable personality and are of a doubting nature. To reduce this group by giving pre-operative sexual education is possible, but this needs much time and personal attention on each case. Other interesting points noted in the series are:

1. The average age of persons seeking this operation was 35·8 years. The youngest was 25 years old, having 2 sons and one daughter and a wife with healed lesion of the lung ; the oldest was in his 50th year, with a total of 10 children born, and having 5 living sons and 2 daughters.
2. The average number of years after marriage that an individual sought sterilisation was 15·1 years.
3. A person seeking sterilisation after 32 years of married life was at the top, while a person with only 5 years of marriage was at the bottom of the list.
4. Persons seeking sterilisation approached with an average of 4·92 children born to them and having 2·21 living sons and 1·08 living daughters.
   Only one person with no son and 3 daughters, sought sterilisation. He had the highest income among the subjects reported.
5. The average income of men seeking sterilisation was Rs. 3,036·16 per annum, the lowest and highest figures being Rs. 384/-, and Rs. 16,200/- per annum.
6. Of 202 subjects there was not a single instance of a Muslim seeking voluntary male sterilisation. There was only one Christian, and 201 were Hindus.
7. Of 201 Hindus, 39·6 per cent primarily belonged to U. P. The rest belonging to Punjab, Bengal and Madras were residing or working in U.P.
8. Of the total cases operated, over 60 per cent preferred to pay and get it done secretly, and less than 40 per cent got it done free at a hospital even when all were allowed the free benefit of family planning. This situation had to be respected, because of its effect on postoperative results on libido and sexual efficiency.
9. Family planning propaganda is having its effects on Kanpur's urban population. Only 0·9 per cent of the series came from rural area—one from Etawah, another from Banda, and none from Kanpur.

10. Most cases, belonged to the middle and lower middle classes and 99·1 per cent was urban.

The class which mostly contributes to the country's food production and provides unskilled labour, i.e., the rural population, is responding feebly to the call of family planning. This will be clear from Table 1. The scheme of family planning for the rural area may have to be reconsidered.

Distribution of 202 cases by profession—Before 18-9-1959, all the 72 cases were gazetted government servants and military officers. The present series covers 202 cases from 19-9-58 to 19-3-60.

TABLE 1—SHOWING DISTRIBUTION OF SUBJECTS BY PROFESSION

Profession	No. of cases	Profession	No. of cases
Clerical	97	Medium businessmen	29
Executive ...	12	Rural	2
Police	6	Doctors (service) ...	3
Engineering ...	1	Doctors (non-service)	5
Technical officers & upper grade staff	42	Labourers ...	5

To encourage family planning in the urban population and allowing the rural to lag behind may disturb the economy of the nation. A long-term planning is called for.

The medicolegal aspect of surgical sterilisation has to be kept in mind. For example, a person had to re-marry after he had been sterilised in 1946. The newly wedded wife desired an offspring of her own. An attempt to rejoin the divided duct after 13 years was unproductive, although spermatozoa could be seen in the discharge off and on. The male partner had not disclosed before his marriage that he was sterilised, and the new wife demanded legal separation—because law allows dissolution of marriage contract on the ground of sterility.

SUMMARY

202 cases out of 272 vasectomies performed in Kanpur are analysed:

1. 202 subjects underwent voluntary sterilisation between 19th September 1958 and 19th March 1960.

2. 198 out of 202 underwent the operation for the sole purpose of limiting their family.

3. Average income of the group coming forward for the operation was Rs. 3,036 per annum.

4. Amongst volunteers for the operation, 201 were Hindus, 1 was a Christian, there being no Muslim volunteer.

5. Of 202 subjects only two were from the rural areas (0·99 per cent of the total, while rural population is 85 per cent of total).

6. 39·6 per cent was born in U.P.

7. 96 per cent had no change in sexual desire, libido and duration, after the operation.

8. Average age of subjects seeking operation was 35·8 years.

9. Average time after marriage when operation was sought was 15·1 years.

10. Average number of living children before operation was 2·21 sons and 1·08 daughters.

11. Average number of days lost in operation was 3.

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WHAT PULMONARY FUNCTION STUDIES TELL

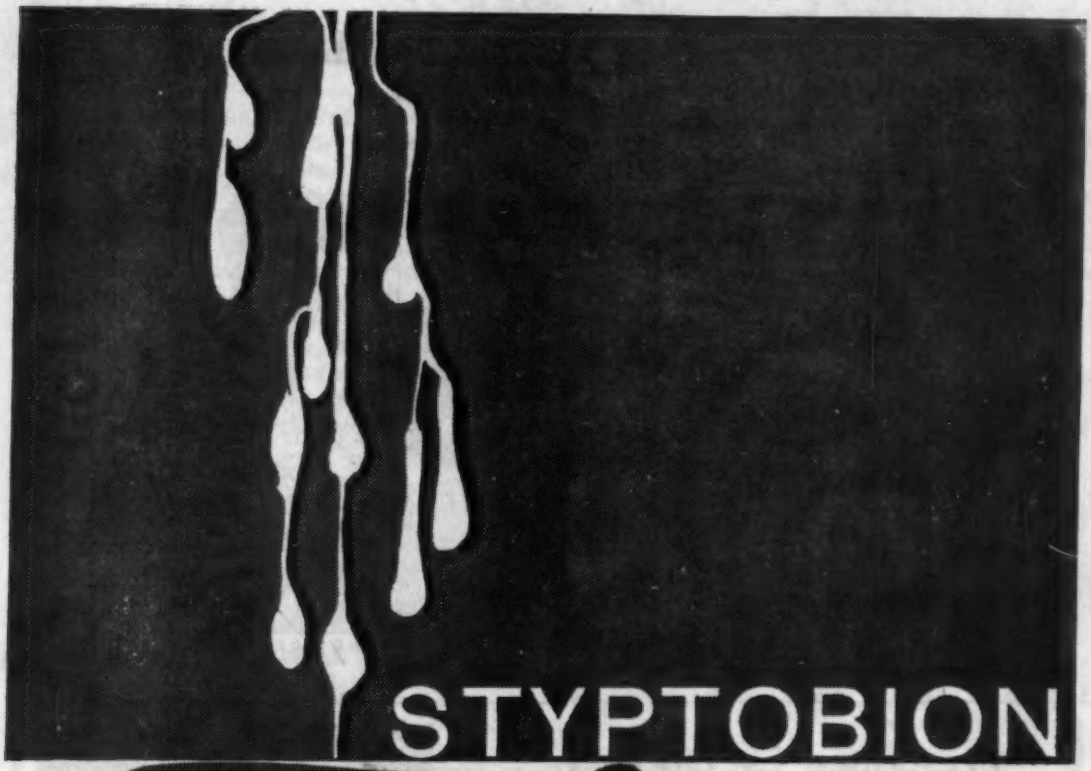
R. K. BHARGAVA, M.D.

Department of Medicine

S. M. S. Medical College and Hospital, Jaipur

There is no doubt that the laboratory tests often only supplement the clinical diagnosis which depends on a good history taking and a thorough physical examination. Once a provisional diagnosis has been made on the basis of the above, the visceral function studies are usually carried out with a view to confirm the diagnosis. The pulmonary function studies, however, do not help in arriving at an aetiological or a pathological diagnosis. They just differentiate between various groups of diseases producing similar effects. They will neither reveal the site nor the nature of the lesion. Even the presence of a lesion may not be detected, if it does not interfere with the functions of the lungs, which have a wide normal range. The idea of this paper is to deal only with the situations in which pulmonary function tests will be of help in coming to some definite conclusions in connection with various chronic pulmonary diseases. The techniques of the tests have not been dealt with here.

1. The most significant application of pulmonary function tests is in connection with the differential diagnosis of the obstructive and



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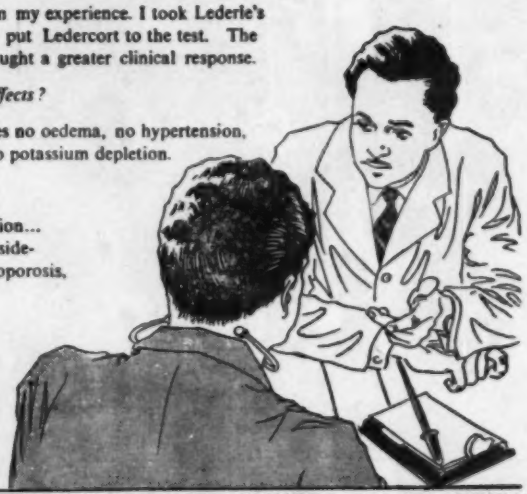

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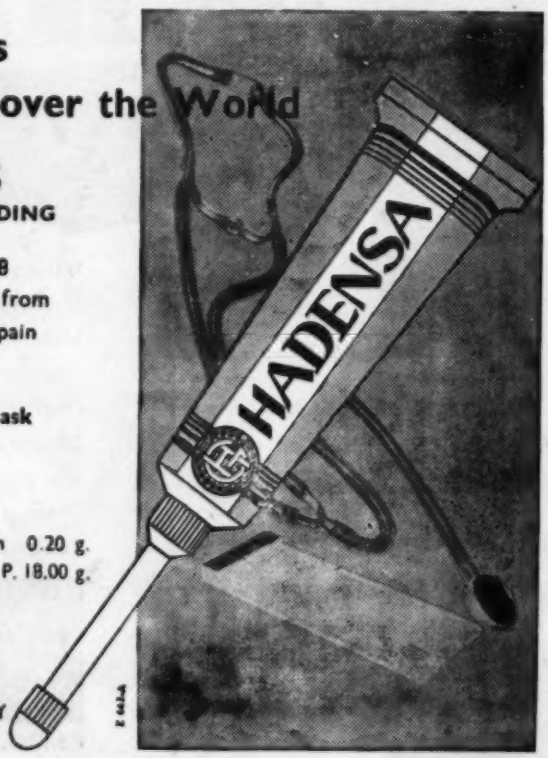

restrictive pulmonary diseases. The former indicates those diseases in which there is some obstruction in the tracheobronchial tree particularly in the region of terminal respiratory passages. This group includes chronic bronchitis with or without emphysema, bronchiectasis, tracheo- or bronchostenosis, bronchial asthma or any other disease which diminishes the lumen of the air passages to a significant extent. While the latter includes diseases in which there is involvement of the pulmonary parenchyma, pleura, the respiratory cage, or the respiratory centre, the end result being restriction of the normal activity of the lungs, which may in turn be localised or diffuse. The diseases belonging to this group are pulmonary tuberculosis, pneumoconiosis, suppurative pulmonary diseases, malignancy, infarction, collapse, syphilis, mycosis, cystic disease of the lungs, sarcoidosis, interstitial pulmonary fibrosis including Hammon Rich syndrome; pleural diseases such as pleurisy, empyema, pneumothorax, pleural new growths; diseases which do not allow the respiratory cage to expand properly, e.g., paralysis of the intercostal muscles or diaphragm and calcification of the costal cartilages. Finally, in the same group should be included the diseases which depress the respiratory centre and produce hypoventilation. At the beginning only those restrictive diseases in which there is ventilatory difficulty will be dealt with. Trouble arises when both restrictive and obstructive diseases exist together as in the terminal stages of the above maladies. Even then, the nature of the dominant lesion, whether obstructive or restrictive, cannot be determined. The results of comparative studies on ventilation and mixing tests in these two groups of diseases have been summarised in Table 1. For comparison the normal values of these tests have also been given. It will be clear after going through the table that the differ-

TABLE 1—SHOWING VENTILATORY STUDIES IN OBSTRUCTIVE AND RESTRICTIVE DISEASES OF THE CHEST

No.	Ventilatory function	Average value	Obstructive	Restrictive
1.	Tidal volume	500 ml.	Normal or increased	Diminished
2.	Inspiratory Reserve Volume ...	3000 ml.	Diminished	Diminished
3.	Expiratory Reserve Volume ...	1000 ml.	Slightly increased	Diminished
4.	Residual Volume	1500 ml.	Increased	Diminished
5.	Inspiratory Capacity	3000 ml.	Diminished	Diminished
6.	Functional Residual Capacity ...	2500 ml.	Increased	Diminished
7.	Vital Capacity	5000 ml.	May be normal, increased or diminished	Always diminished
8.	Timed Vital Capacity (3 seconds)	More than 95%	Less than 70%	Normal usually
9.	Total Lung Capacity ...	6000 ml.	Normal or even increased	Diminished
10.	Ratio of Residual Volume to Total Lung Capacity ...	25%	More than 25%	Normal or less than 25%
11.	Alveolar Ventilation	3500 ml.	Diminished	Diminished
12.	Dead Space Air	150 ml.	Increased	Diminished
13.	Minute Ventilation	2·5 to 5 l.	Increased	Normal or slightly increased
14.	Maximum Breathing Capacity ...	125 to 150 l.	Markedly diminished	Slightly diminished
15.	Ventilatory Reserve	145 l.	Diminished	Diminished
16.	Dyspnoeic Index	More than 95%	Diminished	Diminished
17.	Ventilatory Equivalent ...	2·4 l.	Increased	Increased
18.	Oxygen Removal Ratio ...	50 ml.	Diminished	Diminished
19.	Air Velocity Index	1	Less than 1	More than 1
20.	Pulmonary Mixing Index ...	Less than 2·5%	More than 2·5%	Less than 2·5%
21.	Difference between One-Stage and Two-Stage Vital Capacity ...	Nil	Difference up to 1 litre	No difference
22.	Pulmonary Compliance ...	0·22 l.	Slightly reduced	Greatly reduced
23.	Pulmonary Functions after Bronchodilators	No effect	Improvement	No effect
24.	Air Trapping as seen in Spirogram	Nil	Present	Absent
25.	Fluoroscopy	Normal	Emphysema, a prominent feature	Individual disease localised

entiation between the obstructive and restrictive diseases is fairly significant.

2. Another important application of pulmonary function tests is to find out the exact aetiological basis of diminished arterial oxygen content and tension while the arterial carbon dioxide content and tension are on the increase, e.g., in cyanosis and anoxia. The possibilities in such cases are (a) pulmonary hypoventilation, (b) altered alveolocapillary permeability, (c) arteriovenous shunts that bypass the alveoli. Pulmonary hypoventilation may arise out of diminished pressure in alveolar oxygen, e.g., at high altitudes, tracheobronchial obstruction, depression of respiratory centre or paralysis of respiratory muscles. These conditions giving rise to pulmonary hypoventilation can easily be excluded because here both the ventilatory as well as the mixing tests mentioned above will be abnormal. Further the alveoloarterial gradient (A-a gradient), i.e., the difference in the oxygen tension between the alveolar air and the arterial blood will be within normal limits, i.e., about 10 mm. Hg. In these cases there is neither any defect in the alveolocapillary permeability nor any abnormal venous admixture. Great difficulty arises when one makes an attempt to distinguish between diseases altering the alveolocapillary permeability on the one hand and arteriovenous shunts on the other. Diseases altering the alveolocapillary permeability are pulmonary oedema, interstitial oedema, congestive cardiac failure, instances of alveolocapillary block syndrome such as miliary tuberculosis, sarcoidosis, miliary carcinomatosis, pulmonary scleroderma, beryllium granulomatosis, fibrosis due to exposure to asbestos and sulphur dioxide fumes and the idiopathic variety known as Hammon Rich syndrome. Patients suffering from this syndrome are highly dyspnoeic even at rest. There is marked cyanosis, clubbing of the fingers, pulmonary hypertension and right heart failure. The abnormal arteriovenous shunts will include the peripheral as well as the central shunts between the right and left sides of the heart. In both these groups of diseases evidences of alveolar hypoventilation are absent and A-a gradient is abnormally high. The first step in differentiating these two groups will be to measure the A-a gradient when the patient is breathing two different concentrations of oxygen. If the high A-a gradient is due to altered alveolocapillary permeability, this will not change significantly under the conditions mentioned above. In contrast, if the high A-a gradient is due to abnormal arteriovenous shunt, a comparison of the two levels of alveolar oxygen will reveal a marked fall in the gradient at the lower of the two alveolar oxygen concentrations. Another method for differentiation is by giving the patient pure oxygen to breathe under high pressure. The consequent elevation of alveolar oxygen tension will fully oxygenate the blood and abolish the arterial hypoxia in diseases of the membranes, but will have no effect on arterial hypoxia if the cause is an arteriovenous shunt. Sometimes, however, when the shunt is small all these methods fail to distinguish between the two groups. The last alternative is to find out the diffusion capacity of the alveolocapillary membrane by giving oxygen or carbon monoxide, as the diffusion capacity for the former can be calculated by measuring the diffusion capacity for carbon monoxide and multiplying this with 1·23. Normal value of diffusion capacity of carbon monoxide is 30 ml. per minute per mm. Hg pressure difference. As expected the diffusion capacity will alter in presence of an abnormal membrane, while there will be no change in it if an arteriovenous shunt is present.

In cases of alveolocapillary block syndrome, the pulmonary functions may indicate restrictive, obstructive and alveolocapillary types of insufficiency. In these cases, in spite of marked anoxia, the carbon dioxide content of the blood, in contrast to the severe emphysematous patient, is either normal or reduced as a result of extreme hyperventilation.

3. The third important utility of the pulmonary function tests is to evaluate the subjects for permanent form of collapse therapy or surgical removal of the lung tissues, both as regards immediate risk as well as ultimate useful existence. Every case undergoing lung surgery must have the pulmonary function tests done is advance. For, if there is marked ventilatory insufficiency no useful purpose will be served in undertaking surgery as there is immediate risk of death and even if the patient survives, his disability will be more as compared to the preoperative stage. For instance, if the vital capacity is less than a litre, M.B.C. (maximum breathing capacity) less than 10 litres, ventilatory reserve reduced to less than 10 litres, oxygen and carbon dioxide contents of blood are altered to a great extent with the production of marked anoxia or cyanosis, there can be no point in undertaking major lung surgery in these cases. Still more significant is the determination of the pulmonary functions of the individual lung by bronchospirometry. If the diseased lung is not performing a major share of pulmonary functions and if at the same time the healthy lung in itself can take everything over to a satisfactory extent, then the removal of the pathological lung is

quite rational. But if the situation is otherwise surgery will not be worthwhile. Such studies will also be helpful in the surgery of pulmonary bullae and cysts. In cases where the bullae and cysts are freely communicating with the tracheobronchial tree, there is a considerable dead space ventilation with elevated residual air and diminution in respiratory reserve, but the overall ventilatory mechanism is well preserved because the bullae and cysts usually do not trap significant amounts of air during expiration. Vital capacity, M.B.C., respiratory gas exchanges of either lung will be more or less normal and fluoroscopy will demonstrate that the size of the cyst diminishes on expiration and there is not much of air trapping. Such cases do not require surgery. In cases of bullae or cysts with intermittent or valvular type of communication with tracheobronchial tree, air trapping will be detected by fluoroscopy or spirography. Such bullae or cysts show varying degrees of ventilatory insufficiency and disturbances of gaseous exchange. These may go on increasing in size, compress the normal lung tissue and shift the mediastinum. These cases require immediate surgery. If both the lungs are showing multiple bullae or cysts nothing can be done.

4. In most of the cases of defective perfusion of blood in the lungs it is quite easy to determine whether the cause of defective perfusion is attributable to the heart, the lung or the pulmonary vessels. For, in most of the cases cardiac and pulmonary diseases are obvious and if both of them can be satisfactorily excluded, the defect should lie in the pulmonary circulation. If the pulmonary vascular resistance is high the disease may be present in the heart or the lungs, and if these can be excluded the cause of pulmonary hypertension must be with the pulmonary circuit itself. However, in some obscure cases of pulmonary hypertension, pulmonary functions may reveal disorder of ventilation, mixing, or diffusion so as to favour the diagnosis of secondary pulmonary hypertension due to lung diseases.

5. Another useful purpose of pulmonary function studies is to find out whether a particular therapy is going to be of use in an individual. The efficacy of the various therapeutic measures can thus be assessed. For instance, the effects of bronchodilators, antibiotics, corticosteroids, aerosols or specific hyposensitisation in a case of bronchial asthma can be judged and it seems unwise to continue the therapy when no benefit is obtained by serial function tests. By this the extent of reversibility of the disease can also be judged.

6. Pulmonary function tests may detect significant abnormalities in some cases in which the lungs on clinical and radiological examinations appear to be absolutely normal. Further, if there is significant variation in pulmonary functions the forthcoming pulmonary disease may be appreciated well in advance. For example, individuals suffering from allergic rhinitis and hay fever are very prone to develop bronchial asthma. Hence the earliest changes in pulmonary functions in a case of allergic rhinitis or hay fever may herald the onset of asthma.

7. Pulmonary function tests may be of value in distinguishing between erythrocytosis and erythraemia, particularly when the erythrocytosis is consequent on chronic pulmonary disease or abnormal arteriovenous shunts, for pulmonary function tests are within normal limits in erythraemia.

8. Pulmonary function tests are useful in ruling out pulmonary diseases in non-organic types of dyspnoea such as psychoneurosis and neurocirculatory asthenia.

9. Hypoventilation due to depression of the medullary respiratory centre or due to paralysis of the muscles of respiration can be distinguished from that due to lowered oxygen tension and various restrictive diseases of lung and pleura. In the former there is no significant hyperventilation following exertion, as the respiratory centre or the respiratory muscles themselves are at fault and compensatory mechanisms do not come into play; in the latter group, however, hyperventilation will occur.

10. Lastly, these tests are helpful in the objective appraisal of pulmonary impairment, insufficiency or disability when interpreted in relation to the other findings in the patient. This is of considerable significance not only in employment in various industries but also for purposes of insurance.

Summary

The paper deals with the practical utility of the pulmonary function tests in chronic pulmonary diseases. Particular emphasis has been laid on the following: to distinguish between restrictive and obstructive diseases; to differentiate between the causes of arterial anoxia and carbon dioxide retention in the blood; and, lastly, to determine the role of pulmonary function tests in the evaluation of cases undergoing pulmonary surgery.

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KWASHIORKOR AND MARASMUS

In spite of the controversies regarding the nomenclature, kwashiorkor is the most widely accepted and popular term for a nutritional disorder in infancy and early childhood. The dietetic deficiency responsible for the condition is no longer considered to be one of proteins only but possibly of other nutrients as well and also of calories. While excess of calories has been observed by some workers, less has been found by many others. However, it has been argued that, in Indian children, the calorie intake computed on the basis of per kilogram of substandard body weight, may not be severely inadequate.

For every case of frank kwashiorkor in a population group it has been viewed that there might be as many as one hundred subclinical cases, a good analogy being that kwashiorkor and marasmus represent two visible peaks of an iceberg and that the submerged part of the iceberg represents the subclinical form of protein deficiency. The subclinical deficiency is manifest in the postweaning phase by a falling off of weight gain mainly and also by a predisposition to diarrhoea, respiratory infections, etc. Recognition of the subclinical as well as of mixed cases is therefore important although this tends to make the issue more complex, the exact difference between the pathogenesis of kwashiorkor and marasmus being yet to be settled. Kwashiorkor has been subjected to extensive clinical, biochemical and other studies but relatively fewer investigations have been reported on marasmus. In any case, the simple postulation of kwashiorkor as protein malnutrition and marasmus as calorie undernutrition, is open to criticism.

Elsewhere in this issue, Chaudhuri *et al*[1] have presented a comprehensive account of clinical, biochemical and other features of kwashiorkor, marasmus and the intermediary deficiency states in children as observed in Calcutta. The different clinical types have been categorised in relation to the aetiological background. It appears that nutritional marasmus results from prolonged and gross dietetic inadequacy ; such a child may develop oedema usually of the legs after an attack of infectious diarrhoea and/or fever (marasmic kwashiorkor). Kwashiorkor (with or without dermatosis) on the other hand develops within a short period in a child subsisting on a border-line diet and failing to grow properly ; the condition is commonly precipitated by an infection of similar nature. Variation in the inadequacy of the diet (including breast milk if the child is a breast-fed one), ignorance, customs, prejudices and various infections influence the aetiopathogenesis of the disease. For complete elucidation of the factors responsible for these deficiency states further clinical, bacteriological and biochemical studies are indicated. It appears however from the follow-up study that they are manifestations of the same disease process and kwashiorkor may in course of time transform itself into marasmus.

The nitrogen balance studies by Chaudhuri *et al*[1] indicate that in this condition products of protein digestion are absorbed fairly well in spite of the reported deficiency of digestive enzymes and that the dietary deficiency is the primary factor. One important hindrance to absorption is infantile diarrhoea, a problem of great magnitude. The role of infection in kwashiorkor is an important one and is receiving increasing attention. It is however difficult to disentangle the effects of malnutrition and infection. High nitrogen retention is the usual feature in these children ; they

[1] CHAUDHURI, R. N., BHATTACHARYA, A. K. AND BASU, A. K.—*J. Indian M. A.*, **36** : 557, 1961.

replenish the body proteins when liberal diet is given. Experiences reveal that the protein deficiency in blood and tissues in marasmus is chronic and greater in absolute quantity than that in kwashiorkor which is relatively an acute condition.

Treatment depends much on the severity of the disease when it is diagnosed. The frequent association of infections with kwashiorkor often necessitates injection of penicillin and/or oral administration of sulphaguanidine or streptomycin for the first week or so. Broad spectrum antibiotics are used if indicated. Tuberculosis if present should be treated. Correction of fluid and electrolytic disturbances are as important as proper feeding. Many children come in with marked signs of dehydration. Parenteral fluid therapy must be resorted to in such cases even in presence of oedema of the legs. These acute disturbances can be corrected by proper use of parenteral solutions, plasma or blood. Where vomiting is troublesome gastric lavage will afford relief. Milk is admittedly the best food for the supply of protein and other elements ; it should be gradually increased and given in adequate quantity after the first week or so of treatment, but it need not be skimmed in absence of diarrhoea or gross steatorrhoea. In fact, Chaudhuri *et al*[1] have found that whole milk is well tolerated by nondiarrhoeic cases and particularly the marasmic cases put on weight better than with skimmed milk. If necessary for economic reason, cure can be achieved with the use of vegetable protein diets alone but these must be carefully chosen and skilfully combined. A matter which is now receiving attention is the consumption of locally grown protein-rich foodstuffs by young children. Since animal protein is expensive, attention has been given to vegetables for a cheap source. Of particular importance in this regard are the pulses. Chaudhuri *et al*[1] have introduced a safe mixture for children of the vulnerable age. It is a gruel preparation made of locally available cheap articles, viz., roasted Bengal gram flour, plain or rice water, leafy vegetables and jaggery or sugar which may largely replace milk. This is easily prepared fresh in the home kitchen. Incidentally, it has also the prophylactic value. For prevention, breast milk should of course receive first consideration in case of infants. We cannot dispense with it with impunity, but can the output be improved? In any case, prolonged breast feeding wherever possible is desirable but then the mother's diet would require adequate supplementation. For this, cheap vegetable proteins may be incorporated in the mother's diet as well. Vitamin concentrates are usually not necessary in the treatment of these children except where there is definite clinical evidence. Mineral supplements in the form of potassium salts are important in the early phase of treatment especially in diarrhoeic cases. Iron therapy is instituted afterwards and so also treatment for intestinal helminths if any.

The field of nutrition, including clinical nutrition, is so wide that it interdigitates with every other medical discipline. Food is a fundamental necessity of life, and healthy food of healthy life. The nutrition of people is therefore one of the greatest problems of the present day and has received a great deal of attention from the national and international organisations. The great importance of proteins in nutrition of children has in particular become much more appreciated now than at any previous time. This is mainly because of the interest that has arisen in kwashiorkor and marasmus.

Nutrition and food technology laboratories, research units and enquiries (Indian Council of Medical Research) are all actively engaged in research in various directions. The work is also in progress elsewhere in the country and abroad. Newer knowledge gained by research should be applied to the people in general by public health workers or agencies. This type of implementation would be a matter we shall take pride in.

GENERAL PRACTICE DIGEST

NEUROLOGICAL PATTERNS OF LEPROSY

Leprosy is a disease of the peripheral nerves. Definite diagnosis of 'lepra' can be made only by demonstration of the specific pathology of the nerves, which however varies in different types of the disease. In the tuberculoid type for example, the number of bacilli inside the nerve sheath is small, but due to the violent reaction from the organism an antigen-antibody reaction sets in. Oedema and infiltration with epitheloid cells take place inside the thickened epineurium, with caseous necrosis as the end result. In the lepromatous type however, there is an enormous number of bacilli inside the nerve sheath. The sluggish reaction of the organism sets up a slow and insiduous process producing a perineural granuloma which may lead to strangulation of the nerve fibres. In the borderline (dimorphous) type a mixed picture is found. Both purely tuberculoid and purely lepromatous pathology can also be found simultaneously.

Degeneration and regeneration of nerve is a continuous process in both normal subjects and in leprosy patients. A considerable number of nerve fibres must be destroyed before denervation can be clinically manifest. Sensory loss is very important from the point of view of deformities. An anaesthetic hand can render certain trades virtually impossible. Even more important is the absence of the 'warning mechanism' of the extremity, which may lead to deformities.

Neuritis during the 'lepra reaction' causes pain, swelling and tenderness of the nerve, and frequently deterioration of motor and sensory functions. A tuberculoid nerve abscess may also appear. Neuritis is an important factor in the development of deformities. Treatment of the reaction is an important part in the prevention of deformities. Both motor and sensory impairment can recover spontaneously under treatment. Surgical interference may sometimes help. Medical treatment includes administration of corticosteroids, chloroquin, etc. Application of heat and immobilisation in relaxed position of the affected limbs are recommended.

The neurological pattern in leprosy are fairly well defined. There may be sensory impairment or motor paralysis.

A. PATTERNS OF ANAESTHESIA :

Three types are met with, viz. (a) disseminated anaesthesia; (b) regional anaesthesia, and (c) acral anaesthesia.

1. *Disseminated anaesthesia*—In this impairment there is inability to recognise fine touch as well as the site of stimulus. The circumscribed complete anaesthesia belongs to the tuberculoid group. The borderline and indeterminate groups usually have some impairment, and lepromatous lesions often have preserved sensation.

2. *Regional anaesthesia*—Some of the major nerves are liable to be involved, such as

(a) Ulnar nerve at the wrist or the elbow, producing anaesthesia of the ulnar part of the hand and forearm.

(b) Median nerve at the wrist or rarely at the elbow, involving the palmer aspect of the thumb and radial side of the hand. This is most crippling of the anaesthesias.

(c) Radial nerve in the arm or the forearm, producing the claw hand. This is a rare type.

(d) Posterior tibial nerve just behind the tibial malleoli, produce the plantar trauma syndrome.

(e) Lateral popliteal nerve in the popliteal fossa.

These complications play a major role in the development of deformities. In the tuberculoid type there may be involvement of one or a few of the nerves, while in the lepromatous type there may be more widespread involvement. This is also true of the borderline cases.

3. *Acral anaesthesia*—Typical manifestations include glove and stocking anaesthesia and corneal anaesthesia. This is due to a widespread destruction of the terminal fibres without reference to a particular major nerve. It plays an important role in the development of secondary deformities of the hands, feet, and eyes.

In advanced cases of anaesthesia concomitant anhydrosis is present.

B. PATTERNS OF MOTOR PARALYSIS :

This is selective in nature. It tends to involve motor branches to particular muscles, leaving other branches unaffected—though following certain patterns :

(a) Low ulnar paralysis, attacking ulnar nerve at the wrist with paralysis of the intrinsic muscles of the hand with exception usually of abductor pollicis brevis, radial hand of flexor pollicis brevis, opponens pollicis, and the two radial lumbrical muscles.

(b) High ulnar paralysis, affecting the ulnar nerve at the elbow.

(c) Low median paralysis, with paralysis of the abductor pollicis brevis, radial head of flexor pollicis brevis, opponens pollicis and the two radical lumbrical muscles.

(d) High median paralysis—the long flexors are paralysed to a varying extent. Pronator teres and flexor carpi radialis are rarely affected.

(e) Radial paralysis is rare. The extensors of the wrist and the digits are affected in a variable pattern—it is an exceedingly crippling condition.

(f) Posterior tibial paralysis—This is quite common and involves intrinsic paralysis with development of clawing of the toes.

(g) Complete lateral popliteal paralysis, with involvement of the dorsiflexors of the ankles and digitis and of the peroneal group. This produces the clinical picture of equino-varus foot with drop toes. When there is also posterior tibial paralysis, drop toes are supplanted by claw toes.

(h) Incomplete lateral popliteal paralysis involves the dorsiflexors of the ankle and digits.

(i) Facial nerve paralysis, with simultaneous involvement of the frontalis muscles, produce the distressing condition of lagophthalmos. It may be combined with corneal anaesthesia and damage the eyes.

Here also the tuberculoid type tends to produce isolated patterns, while the lepromatous or borderline type tends to produce widespread paralysis.

Preoperative requirements—In most cases it is possible to restore useful, even normal, function to the paralysed parts. During surgical treatment, the patient should continue regular medication for not less than three months, and must not present signs of lepra reaction or progressive disease for three months. The bacterial index should also be low, otherwise there will be a tendency towards lepra reaction and progressive disease. The patient must have been without evidence of secondary infection for not less than 14 days, preferably one month, before surgery. No attempts at reconstructive motor surgery should be undertaken until the paralysis is established well beyond the chances of recovery. A stable period of six months is accepted as the limit.

Preventive and corrective physiotherapy—At the slightest hint of onsetting paralysis, a full programme of physiotherapy should be instituted. This will make subsequent surgical procedure much easier. Similar considerations are applicable to education and training of the patient with sensory impairment.

For restoration of function in early cases of neural damage, cases should be sent to competent centres as far as possible. The following categories should be given high priority in the reconstructive programme :

(a) Children and young persons.

(b) Persons with a strong wish and possibility of returning to work, and

(c) Persons with lagophthalmos, particularly those with concomitant impairment of corneal sensation.

For endangered vision the restrictions on operation imposed by a high bacterial index can be relaxed considerably, although an active stage of the disease may set off highly undesirable complications in the eye, triggered off by surgical interference. The six month time limit also is not applicable to cases of lagophthalmos. For endocular operations the patient must be strictly negative for a long period. Even then the risk is considerably higher than in other operations.

—From an article by J. G. Andersen, *J. Christ. M. A.*, **36** : 175, 1961.

CURRENT MEDICAL LITERATURE

Guanethidine, a New Hypotensive Agent

HAGEN, J. T. AND ORGAIN, S. (*J.A.M.A.*, **175** : 550, 1961) from Duke University Medical Centre, from a study of 38 patients with hypertension treated with guanethidine observe :

Thirty-eight patients received guanethidine orally over an average period of 19 weeks in divided doses. Therapy generally was begun with small initial doses, 5 to 10 mg. twice daily, with increments in dosage made gradually, depending upon reduction in blood pressure and elimination or control of annoying side effects. The blood pressure fell in all but 9 patients recumbent and 3 erect. A significant fall in mean blood pressure of 20 mm. Hg or more was noted in 9 patients (23 per cent) recumbent and 22 patients (58 per cent) standing, thus pointing out the greater postural effect of the drug. Mild side effects were seen in 33 patients (87 per cent) but were severe enough to discontinue treatment in only 5 (13 per cent). Side effects generally could be alleviated or abolished by reduction of the total daily dose. No serious toxic effects were seen, although one patient developed disseminated lupus erythematosus while on treatment; this disease was not attributed to the drug.

Guanethidine would appear to have definite but limited utility as an antihypertensive agent for the more severe hypertensive patient because of its marked postural effect on blood pressure and the incidence of its side effects. Final conclusions regarding the ultimate usefulness of the drug, administered alone and in combination with other agents, must await more extended experience.

New Drugs in the Treatment of Respiratory Insufficiency

Alveolar hypoventilation leads to hypoxia and retention of carbon dioxide. Such a state of respiratory acidosis may be precipitated by any complication which severely impairs ventilation, or it may be persistent in patients with chronic chest disease. Mental disturbance usually occurs when the pH of arterial blood is less than 7·2 or the pCO_2 higher than 100 mm. Hg, and coma when the pH falls below 7·1 or the pCO_2 rises above 120 mm. Hg. The logical treatment of respiratory acidosis is to employ measures to improve alveolar ventilation, but this is not always adequate. Acetazolamide has been given as an added form of therapy, but the results have been equivocal. A Naimark and colleagues have recently reported the use of dichlorphenamide in the treatment of 15 patients with chronic respiratory acidosis. This drug has a capacity to inhibit carbonic anhydrase estimated to be thirty times that of acetazolamide. It was given in a dosage of 200 mg. daily for periods ranging from 2 to 30 weeks. All but one patient thought his symptoms improved, experiencing less dyspnoea, better effort tolerance, and a general sense of well-being. During administration of the drug there was a consistent rise in the arterial oxygen tensions and in the minute ventilation, in most cases with a slowing of respiratory rate and in increase in tidal volume. Hypercapnia was much decreased in all patients but one. The authors suggest that, in addition to a renal effect, dichlorphenamide has an effect on the respiratory centre, resulting in an increase in ventilation and a lowering of pCO_2.

G. G. Nahas has shown that the organic carbon dioxide buffer, trihydroxymethylaminomethane (known as TRIS or THAM), can prevent acidosis and hypercapnia in dogs rendered artificially apnoeic. G. L. Brinkman and colleagues have recently studied the effect of intravenous doses of 20 g. of THAM in four patients with chronic respiratory acidosis. They found that in all cases it raised the arterial pH but lowered the minute ventilation and the arterial pO. Except in one case in which it was reduced, the arterial pCO_2 remained at approximately the same level throughout the study, in spite of the reduction in respiratory minute volume. These workers attri-

buted this to the increase in urinary excretion of bicarbonate. THAM was also effective in raising the arterial pH in two other cases with severe respiratory acidosis. One patient regained consciousness two hours after its administration and the arterial pCO_2 fell from 160 to 68 mm. Hg. The drug, which was given by infusion through a gastric tube in both cases, caused diarrhoea during the infusion and produced tetany as the acidosis was relieved. Hypoglycaemia did not occur, though this has been reported elsewhere as following intravenous infusion.

F. Manfredi and colleagues have also given intravenous THAM in three cases of severe respiratory acidosis. All were in extremis, and one died within twenty minutes of starting the infusion. The two other patients, both with tracheotomies and under respiratory treatment, improved after the arterial pH rose and the pCO_2 fell, although the total serum carbon dioxide increased. These authors suggest that during infusion of THAM large amounts of carbon dioxide are drawn from the saturated tissues into the blood, and that the excretion of bicarbonate in the urine and the amount of carbon dioxide in the expired air are both increased.

The clinical information on dichlorphenamide and THAM is at the moment very limited. Their modes of action are not yet fully understood. If further information is as encouraging as these preliminary reports, there will surely be a place for these drugs as adjuncts to the treatment of respiratory insufficiency.—Annotation, *Brit. M. J.*, **2**: 1943, 1960.

Nitrogen Requirements for Equilibrium in Burned Patients

SOROFF, H. S., PEARSON, E. AND ARTZ, C. P. (*Surg. Gynec. & Obst.*, **112**: 159, 1961) from the U. S. Army Surgical Research Unit, Brooke Army Medical Centre, Fort Sam Houston, Texas, write:

The nitrogen requirements for equilibrium in burned patients were estimated by two plans of study in which the nitrogen intake ranged from 1·0 to 28·8 g. per square metre and the total calories remained constant at 3,500 per square metre. The two experimental designs were such that the balance data obtained could be subjected to regression analysis. Eleven male patients between the ages of 18 and 33 were studied for four 10 day periods. The periods represented the acute catabolic phase, the late catabolic phase, the anabolic phase, and the late convalescent phase. The patients studied had a burn index ranging from 20 to 35. Eleven normal controls were studied for a 10 day period.

Isolated days of positive nitrogen balance occurred on the days of high nitrogen intake during the acute catabolic phase. The cumulative nitrogen balance was positive in 9 of the 11 patients during the late catabolic phase and it became progressively more positive during the late catabolic phase and it became progressively more positive during the subsequent phases.

Regression analysis of the nitrogen balance on the nitrogen intake showed a progressive decrease in both the nitrogen requirements for equilibrium (x-intercept) and the obligatory nitrogen loss (y-intercept) as the postburn course progressed through convalescence. The amounts of nitrogen per square meter per day estimated to be necessary for equilibrium during the 4 phases ranged from 20·7 to 25·5 g., 13·1 to 16·4 g., 3·3 to 9·3 g. and 3·3 to 7·0 g. respectively.

The nitrogen requirements of the patients during the convalescent phase were similar to the requirements of the controls.

The efficiency of nitrogen utilisation, as represented by the slopes of the regression lines, remained essentially unchanged as requirements and obligatory losses decreased.

Maximum nitrogen storage was not achieved in this study, since the regression lines did not show significant curvilinearity.

Potassium Requirements for Equilibrium in Burn

PEARSON, E., SOROFF, H. S., ARNEY, G. K. AND ARTZ, C. P. (*Surg. Gynec. & Obst.*, **112**: 263, 1961) from the U.S. Army Surgical Research Unit, Brooke Army Medical Centre, Fort Sam Houston, Texas, write:

Potassium balances were measured in 11 burned patients during four 10 day periods. The periods represented the acute catabolic phase, the late catabolic phase, the anabolic phase, and the late convalescent phase. The intake furnished 3,500 total calories per square metre and levels of potassium ranging from 27 to 232 milliequivalents per square metre. Each patient was given the levels of potassium in a different sequence. Eleven controls were observed on an intake identical to that of the patients.

Seven of the 11 patients had a positive potassium balance during period 1. The patients stored increasing amounts of potassium during the successive periods, but the controls showed more positive balances than the patients during period 4. Potassium and nitrogen were stored in a ratio higher than protoplasm in 10 of the 11 patients.

Regression lines of the potassium balances on the intake showed that the requirements for equilibrium decreased as the postburn course progressed. The requirement of the controls agreed closely with that of the patients during period 4. The y-intercepts, the balance on zero intake, also decreased in the successive periods. The regression lines of periods 3 and 4 in plan I were significantly curvilinear; an intake above 140 milliequivalents per square metre caused little increase in the positivity of the balances.

The ratio of the x-intercepts of the potassium and nitrogen regression lines suggests that during periods 1, 2, and 3 a potassium to nitrogen ratio of 6:1 in the intake will result in the most efficient utilisation of the elements at equilibrium. A ratio of 4:1 in the intake was required by the patients during period 4 and by the controls.

Surgical Treatment of Chronic Pancreatitis

DOUBILET, H. AND MULHOLLAND, J. (*J.A.M.A.*, **175**: 177, 1961) from the Third Surgical Division, New York University School of Medicine, Bellevue Hospital, write:

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due to distention of the bile and pancreatic ducts behind a spastic sphincter.

To treat complications such as pseudocyst formation or obstruction due to stricture or stone, the step-by-step procedures that are necessary are (a) cholangiographic studies, (b) pancreatographic studies, (c) drainage of the pancreatic duct, (d) removal of stones, or (e) circumvention of irremovable obstruction by "split pancreaticojejunostomy.

The most common complication of chronic pancreatitis—intolerance to fat and alcohol—must be treated by a low-fat and alcohol-free diet for a period of 2 years after sphincterotomy. This permits the pancreas to regenerate and establish a normal condition.

Diabetes, if present, should be treated with small doses of insulin, since these patients lack glucagon secretion from the alpha cells which controls the hypoglycaemia produced by insulin. There is no evidence that the islet cells regenerate along with the acinar tissue.

Estimation of Total Tissue Potassium After Ureterosigmoidostomies

ANSEL, J. S., GEIST, R. W. AND CREEVY, C. D. (*Surg. Gynec. & Obst.*, **112**: 322, 1961) from the Division of Urology, Department of Surgery, University of Minnesota, and the Minneapolis Veterans' Administration Hospital, write:

In a series of 12 patients with ureterosigmoidal transplantation of a duration of from 3 to 25 years, total body potassium was measured by means of isotope dilution techniques.

The average deficit in body potassium stores was about one-third those of normal individuals in similar age groups.

The mechanisms for development of potassium deficiency in these individuals are discussed.

Continuous replacement with potassium carbonate and potassium citrate or citrus juice dietary supplements is suggested.

Pathological Physiology of Pancreatic Inflammation

DREILING, D. A. (*J.A.M.A.*, **175**: 105, 1961) from the Pancreatic Research Laboratory, the Mount Sinai Hospital, writes:

Although the pathogenetic basis common to all forms of acute pancreatitis appears to be pancreatic duct obstruction, secondary factors such as biliary reflux, vascular ischaemia, and auto-immune mechanisms play important roles in the different clinical varieties of acute pancreatic inflammation.

Elucidation of the pathogenesis of chronic pancreatitis awaits better understanding of pancreatic pathology, unravelling of the mechanism of cellular secretion, and a clarification of pancreatic cellular metabolism. In approximately two-thirds of the patients chronic pancreatitis appears to be the residuum of acute inflammation within the gland or the consequence of repeated acute inflammatory exacerbations. In the remainder, chronic pancreatitis or pancreatic fibrosis results from nutritional deficiency, congenital metabolic defect, or endocrinologic disorder.

CURRENT TOPIC

THE SECRET OF LONGEVITY IN CZECHOSLOVAKIA*

JOSEF DVORAK

A recent Czech survey showed that life expectancy of Prague citizens was 66 years for men and 71 for women. Three decades ago it was 51 and 55 years respectively. Thus the average life span has been prolonged by 15 to 16 years during this period.

Longevity in good health and full physical and mental fitness is a long-cherished dream of man, but realisation of it has become possible, historically speaking only in very recent times. In the middle ages, the average life of man was not more than 20 years. Even in the 18th century it was between twenty and thirty years. It was as late as the 19th century that the average rose to 30 years.

The span of life has stretched in different countries with the development of social and economic conditions. For example, Sweden succeeded in obtaining the average of thirty years about a century before Czechoslovakia. In recent years, however, the average duration of life has been growing at much faster rate in Czechoslovakia.

Truly, the rise in standard of living has played a vital role in prolonging man's life. As compared to pre-war conditions, actual wages rose by 50 per cent, while retail store prices were cut down eight times during the last seven years. A 36 per cent increase in personal consumption was registered during the Second Five Year Plan (1956-60), against the target of 33 per cent. Thus living standards in Czechoslovakia are among the highest in the world.

Next is the role of health services. In Czechoslovakia, health services are available to every citizen free of charge. After the unification of health services in 1952, doctors became public employees and private practice based on profit seeking stands completely abolished. The number of doctors also shows an upward trend. In 1937, there was one doctor for a population of 1,218, in 1959, there was one doctor for 588 people.

Illness naturally is the cause of worry to the sick and his family but treatment, at least as far as its financial aspects go, has ceased to be a source of worry. The incapacitated are entitled to sickness benefits amounting upwards of 90 per cent of net wages or salaries. Sickness benefit is paid from the first day of illness for any period up to one year and in exceptional cases even up to two years. If incapacity continues for a longer period the patient qualifies for a disability pension. Treatment and medicines including the most expensive ones, are supplied free. Maternity benefits are available for women at the same rate as sickness benefits for a period of 18 weeks. Maternity services too are free.

* Released by courtesy of Mr. G. Legler, First Secretary, Embassy of the Czechoslovak Socialist Republic, New Delhi, on the occasion of the 16th Anniversary of the Republic on May 9, 1961.

Similarly, preventive and therapeutic care (including medicaments and balneological treatment) is provided free of charge and without any time-limit to all employees, pensioners and their dependants for the duration of their illness.

Spa and sanatorium in pre-war Czechoslovakia were luxuries available to only a limited number of patients who could pay for them. Today, under State administration, these spas and sanatoria are open to all to the needy and free of charge, too.

Social security undoubtedly is a contributory factor for longevity. In Czechoslovakia all wage-earners, as well as peasants, are entitled to old-age pensions amounting upwards of 90 per cent of their average income. The fact that nobody has to worry about old age or unemployment, too, helps in attaining a high age.

Man's greatest enemy has been infantile and child mortality. Czechoslovakia is trying to overcome it. Now, nine out of ten deliveries take place in obstetric institutions where the babies are taken care of by paediatricians and nurses. Vaccination of children against tuberculosis, diphtheria, whooping cough, tetanus, smallpox and infantile paralysis and similar diseases have also contributed towards a decline in infantile mortality. Thus in 1937 infantile mortality rate per 1,000 births was 117, in 1959 it had dropped to 25·8 and was 13 in the first three quarters of 1960. It is now one of the lowest in the world. Infantile mortality is mostly restricted to newborns who die of developmental defects having their origin in the time before their birth, the causes of which have not yet been fully ascertained by medical science.

Struggle against premature death is being carried by various research centres. Since 1950 over 30 medical research institutes have been established. Research is also conducted at medical faculties attached to Czechoslovak Academy of Sciences.

Naturally, the state expenditure on the national health services has been rising steadily since 1948. In 1949 it was 167 crowns per head, in 1953 it had risen to 389 crowns and in 1959 to 440 crowns (nearly 300 rupees, 1 crown being equal to 1·51 rupees).

Constant progress of health services is more effective because of their new social orientation. In the past the working people were the most neglected, but now appropriate care is devoted to them. In 1938 only fifteen industrial enterprises maintained health facilities and that too of a primitive form. Now every factory is equipped with up-to-date means which are making rapid development year by year. Ten per cent of the total number of medical practitioners are now employed at the Works. Modern factories have proper light arrangements, spacious halls and other facilities conducive to workers' health. Working time is being further shortened and the period of leisure prolonged.

All these factors taken together have created favourable conditions for longevity. The fact that the average duration of life has become longer in Czechoslovakia shows that the efforts of its health services are bearing fruit.

NOTES AND NEWS

India has Lowest Calorie Intake

Irishmen have the highest daily intake of calories (3,500) followed by New Zealanders (3,430), Danes (3,350) and Britons (3,290), according to the U.N. Year Book published on May 14, 1961. India has the lowest calorie intake figure—1,800. Whereas people in some underdeveloped countries spent more than half their income on food,—Ghanaians 57 per cent and Ceylonese 54 per cent,—the figure for the U.S., Canada and Australia was about 25 per cent. The year book listed four countries—Ceylon, Britain, Ireland and Italy where people spent more on tobacco and beverages than on clothes.

Diseased Mummies

Ancient Egyptians suffered from gout, bedsores and many other diseases of modern man, but not from syphilis, according to a Sheffield (Yorkshire) surgeon, Dr. J. Thompson Rowling. In a paper read before the Royal Society of Medicine and published in the May issue of the proceedings of the society, Dr. Rowling described the pathological changes which have been observed in mummies following the introducing of improved research techniques.

"Mummies seem to have been heir to most of the diseases with which we are familiar at the present day, with the notable exception of syphilis," he says. He mentions cases of a young mummy with hydrocephalus and an 'old priestess with bedsores'. One mummy showed "marked lesions of gout".

The mummy of Rameses V "shows a well-marked papular eruption on the face and lower abdomen characteristic of smallpox".

Undoubted cases of tuberculosis, pneumonia and appendicitis have also been found and stones have been found in the gallbladder, kidney and bladder. Leprosy was not common, but one case was found.

Motion Pictures Show Flow of Blood to the Heart

Doctors for the first time can now take x-ray motion pictures of the network of arteries that provide blood to the heart. A method in which a flexible plastic tube is inserted directly into the coronary arteries has been successfully tested on heart disease patients in the Cleveland Clinic in Ohio. The technique was devised by Dr. F. Mason Sones and his associates at the clinic.

Doctors for a number of years have been able to insert catheters into the heart and contrast dye through the catheter to enable motion pictures being taken. The pictures clearly display how the dye circulates through the heart. Obstructions clearly manifest themselves.

Using this method it is now possible to demonstrate that some patients are not suffering from heart disease despite symptoms to the contrary. This method also offers a means for diagnosis of the damage to the heart's blood supply caused by narrowing and hardening of the arteries following a heart attack. It can also more exactly appraise the value of different therapeutic means used to increase the heart's blood supply.

It is hoped that this motion picture technique will be useful in detecting coronary heart disease before symptoms become apparent.—*USIS.*

The Poison We Breathe

In Mexico City, the average visibility up to 1940 over the city was between 10 and 20 km. Now it is hardly more than 4. During *fine weather* about 5 tons of dust and grit are deposited per square kilometre per week over the city (*15 tons* in the centre). In Great Britain over *a million tons of smoke* are emitted yearly from domestic fires; half a million from industry; and 100,000 from the railways. Out of *900,000 tons* of grit and dust liberated into the air domestic chimneys emit 100,000. Sulphur dioxide emitted amounts to *5·5 million tons* with domestic fires emitting nearly a million tons of this.—*World Health,* May-June, 1961.

The Law and the Protection of the People against Air Pollution

Air pollution is a field in which the interests of different sections of the population may conflict and *pollution abatement* is an *expensive undertaking*: so the law needs to step in. A quick glance at legislation in different countries reveals some remarkable differences in approach.

AUSTRALIA: In Victoria, the emission of rank or dense smoke from industrial chimneys is *prohibited,* with certain exceptions, and no new industrial fire-places may be installed unless they are, as far as practicable, smokeless. In addition, a *Clean Air Committee* investigates problems and makes recommendations to the responsible Minister.

CZECHOSLOVAKIA: A decree passed in 1954 for the control of air pollution includes provisions for *fuel selection;* the suppression of atmospheric pollution around schools and hospitals, and in parks, health resorts and places of recreation; and the siting of gardens in factory zones and residential areas. *The Hygiene and Epidemic Control Service* is responsible for supervising the abatement of air pollution.

FRANCE: Regulations governing most industrial firms in France include a clause *prohibiting* the discharge into the air of substances likely to be detrimental to public health and safety, agricultural production, public monuments and scenic beauty. More specific regulations were introduced nationally in 1932, particularly in the *Paris region,* but results have not been satisfactory and the Government has arranged for a study of the problem.

NETHERLANDS: To prevent air pollution, the construction of an industrial plant is subject to an *approval procedure* in which the Crown, on the advice of the Minister of Social Affairs and Public Health, has the final say.

SWEDEN: There are no legal provisions in relation to air pollution. Any person suffering damage through pollution can institute a *civil action* against those responsible. If pollution is causing obvious damage to health, local authorities may intervene.

UNITED KINGDOM: After the disastrous London smog of 1952, a committee was appointed by the Government to investigate air pollution, its recommendations form the basis of the *Clean Air Act* passed in 1956. The Act is operated by local authorities and limits the emission of dark smoke and solids. In *"smoke control areas"* established under the Act, regulations are especially stringent. Height of chimneys, mine refuse, and pollutants from special chemical processes are also subject to national legislation.

USA: Unlike the United Kingdom, the USA does not have nation-wide legislation on air pollution. However, state, country and city regulations, *backed by public opinion,* have achieved some remarkable improvements—notably in the Pittsburgh area.

USSR: No electric power station may be constructed without the simultaneous installation of equipment for *dust and ash absorption.* Corresponding restrictions apply to factories processing non-ferrous metals, coal-tar distilleries, and iron and steel works. For air in towns, maximum *permissible* concentrations of noxious substances have been laid down. For sulphur dioxide, for example, the maximum permissible level at any one time is 0·5 mg. per m^3 and on a 24-hour average 0·15 mg. per m^3.—*World Health,* May-June, 1961.

Cancer-combating Substance

Japanese scientists claim to have discovered a substance in mushroom which can combat the growth of cancerous cells. Most of the 700 species of mushrooms examined by them were found to contain this substance, leading the scientists to believe that mushrooms eaten at meals should help to check cancerous growths in humans. The substance was extracted from ground mushrooms by using acetone and methyl alcohol. During tests, the scientists injected this nameless substance into 591 mice affected with cancer and of them 84 were reported to have recovered while the disease was checked in another 146 mice.

Swiss Medical Team's Theory on Cancer

A Swiss medical team, a doctor and a pharmacist, suggested in a lecture delivered at Paris on May 10, 1961 that cancer could be arrested or even cured by the substitution of vegetable oils for animal fat in the patient's diet.

Dr. C. Kousmine and pharmacist J. P. Gaillard said that their years of research led them to believe that cancer attacked people with weak livers. When a patient had cancer, they said, he felt better—and sometimes was even cured—if he consumed less fat, and particularly if vegetable fats were substituted for animal fats in his diet.

Vegetable fats, they believed, were rich in "Vitamin V". This vitamin according to their theory could prevent the appearance of cancer or in cases where it already existed, stop its progress, provided it (vitamin) was present in great enough quantities in the diet.

New Treatment for Cancer

The newspaper, *Pease Sera* of Rome announced on 27-5-61 that Mr. Giocondo Protti, director of a radio-

isotope laboratory, has achieved important results in treating cancer of the thyroid by intravenous injections of natural fermenting agents. Experiments by Mr. Protti over 30 years showed pronounced effects of these agents on cancerous cells without affecting normal cells. His results have been recognised and accepted in a medical symposium on "the biological action of ferments" organised by the Italian Association for Hygiene and Public Health.

Chemical Treatment for Cancer

Prof. Nikolai Blokhin, a cancer specialist of Moscow said on 10-5-61 that Soviet scientists had achieved 95 per cent success with skin cancer. According to Tass Agency, he said that they had discovered chemical means to slow down the development of malignant tumours, though he did not expect a sensational discovery of a universal cure for all cancer. They were studying its origin, and if this were established new prospects for treatment would open up.

Gift To Nuffield Foundation

Lord Nuffield, British motor magnate, has made over all his shares in Morris Garages Limited to the Nuffield Foundation he set up in 1943, it was announced on May 22, 1961. The gift, unofficially believed to be worth more than £500,000 (about Rs. 67 lakhs), is to be known as the Viscount Nuffield Auxiliary Fund. It will help the blind, deaf-mutes and children's homes. Other charities may be included later.

The Nuffield Foundation, for the promotion of health, education and social work within the Commonwealth, had an initial capital of £10,000,000 (about Rs. 14 crores).

Cobalt Therapy Unit at Chittaranjan Cancer Hospital

Prime Minister Nehru inaugurated the Telecobalt Therapy Unit at the Chittaranjan Cancer Hospital on 8-5-61. The Unit was donated by the Canadian Government under the Colombo Plan and this was one of the most highly powerful apparatus irradiating energy from radio-active cobalt for effective treatment of cancer cases. Dr. Subodh Mitra, Vice-Chancellor, Calcutta University and Director of the Cancer Institute in his report said that this Cancer Centre was not a mere hospital. Its unique features were represented by survey of cancer cases all over India, creation of cancer consciousness both among the general medical practitioners and the general public with a view to detect early cancer cases, fundamental researches to find out the nature of cancer, investigation for cancer remedies.

Addressing the gathering the Prime Minister observed that he was glad to see that this Institution was not only growing but had become well-known throughout India. Later, Dr. B. C. Roy, Chief Minister, who was also present at the function announced that Maharani of Nepal had donated a sum of Rs. 50,000, adding that she had previously also donated Rs. 45,000 to the Cancer Hospital. Dr. Roy said that Sri N. C. Dutt had also donated Rs. 10,000 and the Rangers Club Rs. 1,000.

Symposium on High Blood Pressure

A symposium on hypertension was held at the Calcutta School of Tropical Medicine, on 26-4-61 in which a number of distinguished physicians of the city participated.

Dr. R. N. Chaudhuri, Director of the School, presided over the symposium. With the prospect of the conquest of communicable and preventible diseases being increasingly bright, he stated that hypertensive heart diseases claiming a major share in the disease and disability of man poses a problem of major consequence. He referred to the pioneering work of Sir R. N. Chopra regarding the value of the Indian drug Rauwolfia and its derivatives.

The chemistry of the drug was described by Prof. R. N. Chakravarti. The causes of high blood pressure were discussed by Drs. H. K. Roy and M. K. Chhetri. In 80 to 90 per cent of cases the precise cause of high pressure is not known. Psychic factors, environmental stresses, hormonal imbalance, dietary habits and hereditary factors appear to have some contributory role. Role of sodium chloride in the causation of high blood pressure was discussed by Prof. R. L. Nath, Prof. S. N. Sen described the various manifestations of the disease. Dr. S. P. Basu described the value of x-ray in the diagnosis of hypertension. The various changes in blood and their significance were discussed by Prof. J. B. Chatterjea. The changes in heart condition as revealed by electrocardiography and phonocardiography were described by Dr. H. K. Bose. Structural changes in heart, brain and kidneys were described by Prof. P. C. Sen Gupta, Prof. N. R. Konar discussed the ways and means by which the course of the disease can be assessed.

In the absence of precise knowledge regarding the cause of high blood pressure there is scope for further improvement in the treatment schedules. The nature, mode of action and drawbacks in the use of drugs now used in the treatment of high blood pressure was described by Prof. M. L. Chatterjee and Dr. J. N. Mandal.

Prof. J. C. Banerjea discussed the ways and means of utilising the available drugs to the best advantage of a patient with high blood pressure. Dr. R. N. Chatterjee while discussing the social aspects emphasised the role of quiet life and its relation in the prevention of hypertension.

The Chairman of the Symposium, Dr. R. N. Chaudhuri, at the end of the session briefly summarised the proceedings of the symposium, focussing particular attention on the important points raised in the discussion. In his concluding remarks, Dr. Chaudhuri indicated the trend of research work undertaken and accomplished till today, leading to the present status of knowledge on hypertension. He also drew pointed attention to the lacunae looming large and enumerated the problems requiring early solution. Answers to the question raised, he stressed, will go a long way to influence the management of hypertension, which till today is planned as a basis, not always rational. He particularly stressed the need for an active and vigorous exploration of the mechanism operating in the causa-

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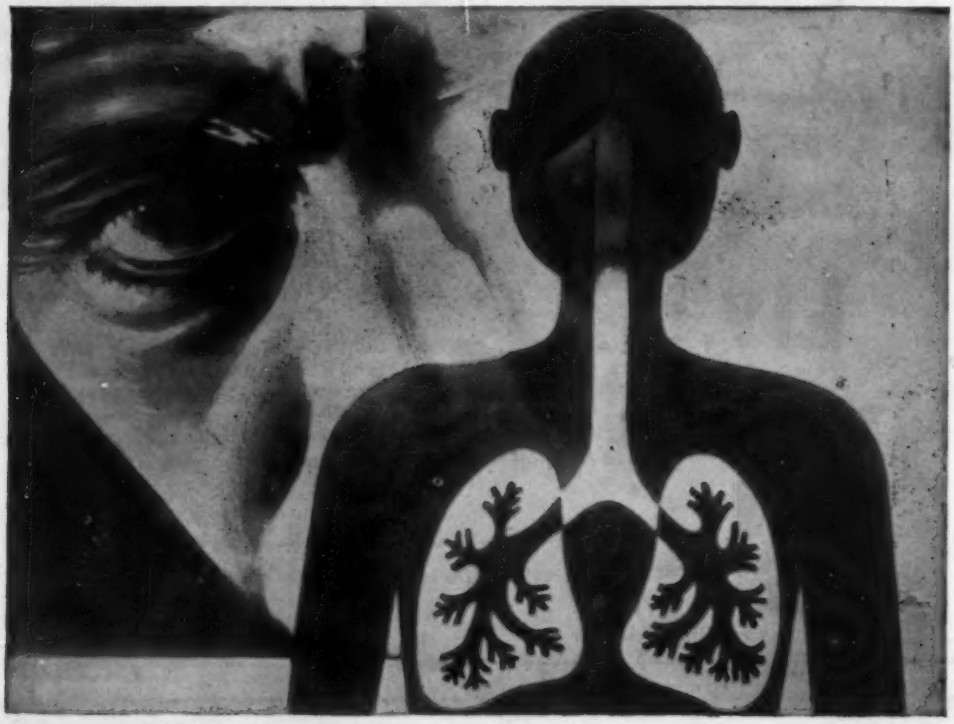

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tion of hypertension, which according to him, holds the key to an effective remedy.

Anti-Fly Week

An anti-fly week will be observed from July 1 throughout the country to focus the attention of the public on the menace and to enlist their co-operation in checking the growth of flies.

The Central Government has asked the State Government to carry out a residual spray of DDT or gemmaxene in areas infested with flies.

More Medical Students Wanted

The Medical Council of India recently recommended to the Government of India that to meet the increasing demand for doctors, the medical colleges should increase admission by 50 per cent from the next academic year for a transitional period of 10 years. No college should, however, admit more than 200 students "provided facilities are also increased."

The recommendation was based on a decision taken by the Executive Committee of the council and also on a resolution moved by Dr. Roy, Chief Minister of West Bengal and a prominent member of the Medical Council of India.

Dr. Roy said that the increasing demand for medical facilities was appreciated both by the people and the Government. He, however, admitted that with the present staff and equipment at the disposal of the medical colleges an increase in admissions would mean a certain "lowering of standards," but "we have got to do it with our eyes wide open in view of the great demand for doctors."

The council also accepted another recommendation of the executive committee to continue English as the medium of instruction in the medical colleges for the present. It was noted that out of the 67 replies received by the council from medical bodies and institutions on the question of the medium of instruction 63 were in favour of retaining English.

Doctors for Villages

State Governments have taken many steps to attract medical men to the rural areas where in some parts, hospitals are unmanned.

These include provision of residential accommodation, and payment of additional allowance to qualified doctors.

The Uttar Pradesh Government awards six scholarships to students belonging to the rural and hill areas and studying medicine on condition that they will serve the rural and hill areas for five years after the M.B.B.S. course.

In Maharashtra, the scheme of subsidised medical practitioners has been in operation for many years. Under the scheme, a medical practitioner is paid a fixed honorarium, travelling allowance and medicine grants.

The Gujarat Government is considering measures such as rent free quarters, travelling allowance for the doctor and his family once a year to visit his native place in the State and special pay to attract medical men.

In Madras, the Government has recently raised the scale of pay of assistant surgeons. Medical Officers serving in the rural areas are given preference in the selection for admission to the post-graduate diploma and degree courses and for specialised training in important upgraded medical institutions. Residential accommodation for them is also being built.

In Kerala, the scale of pay of all medical officers has recently been revised.

The Mysore Government has offered an incentive for those who opt to serve in the villages. Assistant surgeons in Grade II will be promoted to Grade I if they work for five years in the rural areas.

In West Bengal, the emoluments of the medical officers have also been increased.

The Andhra Pradesh Government gives Rs. 100 per month as additional rural allowance to qualified doctors.

Japan Association for Study of Congenital Anomalies

The Japan Association for Study of Congenital Anomalies held its initial meeting at the Kyoto University, Faculty of Medicine on February 25, 1961. Approximately one hundred scientists in basic and clinical medicine, and in related biological sciences, were in attendance. For the time being, the Association has been established on an informal basis, by an organising group consisting of distinguished professors of various faculties and institutions. The Asociation will welcome friendly communications from foreign scientists who may be interested in the problem of congenital anomalies.

Indian Council of Medical Research

Application is invited for the post of an Assistant Editor for Indian Journal of Medical Research.

The prescribed form of application and further details may be obtained from the Director, Indian Council of Medical Research, Post Box No. 494, New Delhi.

The Bombay Obstetric and Gynaecological Society

The Bombay Obstetric and Gynaecological Society invites thesis or essay on "Any Original Work on Human Sterility" for the award of Dr. S. N. Bhansali Charitable Trust Prize for the year 1960. The value of the prize is Rs. 500/-. The competition is open to Registered Medical Graduates of Statutory Indian Universities and Registered Medical Licentiates of Examining Bodies in India. The entries should reach the Society's Office by Registered Post by *1st November 1961.*

The Society also invites Thesis or Essay on "Pathology and Management of Uterine Prolapse" for the award of Dr. Herculano De Sa Silver Jubilee Prize for the year 1961. The value of the prize is Rs. 250/-. The competition is open to Registered Medical Graduates of any Statutory Indian University and Registered Medical Licentiates of Examining Bodies in India. The entries should reach the Society's Office by Registered post by the *31st December, 1961.*

Full details and rules governing the award of the Prizes may be obtained from the Honorary Secretaries,

Bombay Obstetric and Gynaecological Society, Purandare Griha, Chowpatty Sea Face, Bombay 7.

Indian Psychiatric Society

The 14th Annual General Meeting of the Indian Psychiatric Society was held at Ranchi on March 23, 1961. The Conference was inaugurated by Sri T. C. Puri, Commissioner, Chotanagpur Division, Ranchi. The Scientific Session was inaugurated by Shri D. P. Karmarkar, Union Health Minister. 20 Scientific papers were read at the Conference and there was also a panel discussion on "Depressive Reactions". About 50 delegates attended the Conference from various parts of the country.

The office-bearers of the society for the year 1961-62 are: President—Dr. K. R. Masani; Vice-President and President-elect for 1962-63—Dr. C. C. Saha; Hony. Secretary—Dr. K. Bhaskaran; Hony. Treasurer—Lt. Col. Kirpal Singh; Editor of the Indian Journal of Psychiatry—Lt. Col. M. R. Vachha.

Yogic Hospital in Maharashtra

Shrimati Amolak Devi Tirathram Gupta Yogic Hospitals was declared open by Shri Morarji Desai, Central Minister for Finance on the 23rd April 1961 at Lonavala, near Poona in the Maharashtra State. Dr. R. V. Sathe, president of the Association of Physicians of India, presided over the function and Shri D. P. Karmarkar, the Union Health Minister, who also graced the occasion, delivered a benedictory speech.

The Institution, with accommodation for 28 patients will admit carefully selected cases for treatment by the Yogic method. An elaborate questionnaire, to be filled by applicants desiring admission, will form the basis for such selection. Regulated diet and mode of life, with restrictions of smoking, stimulating beverages and intoxicating substances will be insisted upon. Suitable Yogic practices and procedures will be prescribed by the attending physicians and will be carried out under the supervision of specially trained Yogic instructors and demonstrators. Daily prayers and meditation will be a part of the routine for their psychophysiological influence towards recovery.

The S.M.Y.M. Samiti (Shriman Madhava Yoga Mandir) which has sponsored this hospital is recognised for its scientific and philosophical research activities in the field of Yoga. Its laboratory, housed in a spacious building, is equipped with modern instruments in electronics, physics and biochemistry, with precision and quality, such as electro-encephalograph, electrocardiograph, spectro-photometer, gas analysis apparatus, etc. The staff in the laboratory, well-qualified and devoted to research in the field of Yoga Techniques, are constantly devised to enable observations with these instruments on the different phases of Yogic practices. Elaborate observations are made on respiratory, circulatory and central nervous functions in the state of "Samadhi" or Yogic trance. Special closed chambers, called "burial chambers" are constructed, with facilities to conduct continuous observations for several days on occasions, in this state. The work in this field already published in *Yoga Mimamsa*, the Journal of the Samiti has already earned international reputation. This laboratory will be available to the hospital, which is situated close to it.

The newly opened institution aims at giving relief to those suffering from chronic functional disorders by disciplined life and suitable Yogic practices. While doing this, it will assess the particular fields suitable for the application, of these methods, the indication and contra-indications, if any, for the same, and the precise mechanisms by which the results are obtained.

All-India Cancer Conference

Under the sponsorship of the Indian Cancer Society, it is proposed to hold the First All-India Cancer Conference on December 8-10, 1961, at Bombay. Scientific papers on tumours and related problems are invited. The last date for sending the abstracts is 30th September 1961.

Further information may be obtained from the Hony. Secretary, Indian Cancer Society, Hospital Avenue, Parel, Bombay 12.

CORRESPONDENCE

The Editor is not responsible for the views expressed by correspondents

No Shortage of Doctors in Bihar

SIR,—In Bihar Legislative Council, while replying to a suggestion of Sri Radha Krishna Pd. Sinha to convert all the Health Sub-centres in N.E.S. Blocks into village dispensaries, the Bihar Health Minister recently stated that in that case he would require 3,000 doctors. But already they are running 110 centres without any doctor, although the Government has relaxed the age limit for service entry to 34 years. The member, perhaps, not being properly informed, could not challenge his statement. There will be 1,500 Health Sub-centres in Bihar and when all of them start functioning, he would require 1,500 doctors of L.M.P. or M.B.B.S. qualification, if the suggestion of Sri Radha Krishna Pd. Sinha is given effect to. The Government has already employed nearly 300 doctors, so they require 1200 doctors more. There are about 5,000 doctors in Bihar. Out of them 1,200 doctors will surely be available if the age limit be totally waived off and L.M.P.'s may also be employed at par with the graduates. This was done during the last War and can be done even now. I can assure the Government that if they approach the I.M.A., they will get the required number of doctors. The doctors are complaining that they have not got enough work and the Government are complaining that they are not getting doctors for employment. This is a tragedy. The authorities are not willing to examine the position.

The doctor : population ratio in Bihar is 1 :10000. The annual admission in the Medical Colleges in Bihar is 450 and seats are going to be increased. If the present needs are fulfilled by the plan suggested above, shall the Government be able to employ all the newcomers any where? Definitely they are going to produce unemployed experts. This is an alarming situation. I hope the Government will give it due consideration.

I am, etc.

P.O. Tajpur,
(Darbhanga)

(DR.) S. N. AGRAWAL

REVIEWS

Chromatographic and Electrophoretic Techniques, Volume II, Zone Electrophoresis—Edited by Ivor Smith, B.SC., PH.D., F.R.I.C.; 1960, William Heinemann, London; 22·2 cm.×14·2 cm., pp. 215; 30s. net.

This book has been designed to provide necessary information on the practical aspects of zone electrophoresis. There are six main chapters. In the first chapter, in addition to general techniques and interpretations of paper electrophoresis at low voltage, the standard methods for examination of proteins, amino acids and nucleotides are detailed. Electrophoretic analysis of haemoglobin is described in the second chapter. The other subjects covered in the four succeeding chapters in order are : Cellulose acetate electrophoresis and immuno-diffusion techniques; agar gel, starch block, starch gel and sponge rubber electrophoresis; high voltage paper electrophoresis; and continuous electrophoresis.

The editor and his team have been successful in bringing together in a concise form the tried and tested methods of zone electrophoresis. To give as much of the practical detail as possible, the theoretical considerations have been deliberately left out. Indeed, for its size, the book must be considered remarkably complete in essential technical points involved in the useful application of zone electrophoresis for the solution of medical, biological, agricultural and industrial problems.

The book is strongly recommended for all interested in one or other aspect pertaining to the electrophoretic techniques.

J. B. CHATTERJEA

Blood Diseases of Infancy and Childhood –By Carl H. Smith; 1960, The C. V. Mosby Company, St. Louis, U.S.A.; 9¼″×6½″, pp. 572; $17.00.

Blood diseases constitute a significant proportion of ailments in the paediatric age group. The hereditary and the congenital disorders would usually manifest at this period and the paediatricians will be called upon more often than not to evaluate the presenting features. The approach to diagnosis in other haematologic disorders which are known to correspond to those in adult life is often complicated by concomitant alterations which normally accompany the growth phase in the haemopoietic and other systems of the body. The purpose of this book has been to present the essentials of paediatric haematology in a form suitable for the medical student and practitioner.

The subject matter has been divided into 27 chapters which cover all the aspects of haematology likely to be met with in paediatric practice. There is much useful information on haematologic disorders which though common in infancy and childhood are by no means restricted to this age group. Thus the general discussion on the hereditary haemoglobinopathies, drug induced haemolytic anaemia due to enzyme deficiency, blood coagulation and the purpuras will interest many others not primarily interested in paediatrics. The exposition of subject matter has been clear and the style and presentation commendable.

A statement on anaemia in malaria does not appear to be in order. It has never been proved that "malarial infection produces anaemia by toxic inhibition of the marrow". This is however, a minor point which would not detract anything from the intrinsic merit of an otherwise excellent book.

The book is strongly recommended for paediatricians, haematologists and all those interested in one or other aspect of blood diseases.

J. B. CHATTERJEA

Essentials of Chemical Pathology—By D. N. Baron, M.D.; 1960, 2nd Edition; The English University Press Ltd., London, E.C. 1; 8½″×5½″, pp. 247; 10/6 net.

In this book the author provides a lucid and concise description of the biochemistry of the human body and of its different systems, particularly from the point of view of a clinician. The omission of the laboratory techniques and the inclusion of descriptions of the normal physiology and metabolism of the different systems have made this book a pleasant reading and extremely useful to the clinicians and the students preparing for the higher qualifying examinations.

H. SAHA

Internal Medicine: A Physiologic and Clinical Approach to Disease—By Robert P. McCombs; 1961, 2nd Edition; Year Book Publishers, Chicago, U.S.A.; 9″×6″, pp. 750; $10.50.

In these days of independent specialities and multiple authorship in text-books even in U.K. not to speak of U.S.A., it is indeed a bold step on the part of a single author to venture a book on internal medicine. But undoubtedly single authorship has many advantages—such as uniformity in the various chapters, lucidity and avoidance of duplication. And in the volume Dr. McCombs has attained a high degree of efficiency in presentation of various subjects in a highly compact, simplified and integrated manner. Although "Hand

book" in size, the book has not limited itself to the statement of factual data but is based on physiological concepts and the scientific approach. The information is most up-to-date particularly for diagnostic methods and recent therapeutic developments. Incorporation of various current concepts like counter-current theory of urinary concentrations, molecular enzymic deficits of hereditary diseases, auto-immunisation and a host of other current physiological facts is possible for a single person with much painstaking labour and meticulous care which the author has not spared in bringing out this book.

As in the first edition, exclusion of neurology in the book of internal medicine will be keenly felt in those countries where neurology has not been completely separated as an independent speciality in the undergraduate course and in general practice. Tropical diseases having been only passingly discussed will not be of much practical help to doctors in the tropics.

H. S. CHAKRAVARTI

OBITUARIES

Dr. R. C. Prasad

Dr. R. C. Prasad was born at Garhara (Monghyr) in 1919. He passed the I.Sc. examination from Begusarai and the L.M.P. from Darbhanga. He joined Government service in 1943 and was posted at Bikram Hospital and then in Monghyr Municipality as A.H.O. He joined the condensed M.B.B.S. course and graduated in 1948. He passed the D.P.H. in 1954.

At Palamau (Daltonganj) Dr. Prasad was serving as D.M.O.H. In November 1960, he got a heart attack with low blood pressure. He was in the Medical College Hospital, Patna, as an in-patient for three months. He breathed his last on 19-3-61, at his residence.

Dr. Prasad was a man of amiable temperament and was loved by all.

Dr. R. T. Desai

Dr. R. T. Desai, well-known Bombay surgeon, died on 12-2-61 at the age of 62 years. He was born in Surat.

After matriculating in 1918, he joined the Wilson College and distinguished himself both as a scholar and an athlete. He obtained M.B.B.S. from the Grant Medical College in 1924, and then went to U.K. where he worked at Bart's and the Middlesex in London and at the Royal Infirmary, Edinburgh. He got D.L.O. (Lond.) in 1927 and F.R.C.S.E. in 1929.

Back in Bombay, he soon became a well-known and popular figure. Plastic surgery was his special interest. Dr. Desai was Hony. Surgeon at the B. J. Wadia Hospital from 1931-1943; Hony. Surgeon and Lecturer in Surgery at the B. Y. L. Nair Charitable Hospital from 1930; Consulting Surgeon at the Kanchangarri Maternity Home from 1930; Hony. Surgeon at the Bhatia General Hospital from June 1954; Examiner in Surgery for Bombay and Gujrat Universities; Principal of the T. N. Medical College (1945-46). All these posts he held with distinction.

Dr. Desai was a man with a dynamic personality. Besides being a very dexterous surgeon he was known for his kindly and jovial disposition and was a popular figure in the student world. As the Principal of the National Medical College he rejuvenated the college by his indomitable efforts, having introduced numerous medical subjects so far not taught in the then L.C.P.S. college, with a view to bring it up in alignment with the sister M.B.B.S. institutions in the city.

He leaves behind his wife, a daughter, two sons, one of whom is a surgeon in Bombay.

DR. R. T. DESAI

DR. R. K. CHOUDHARY

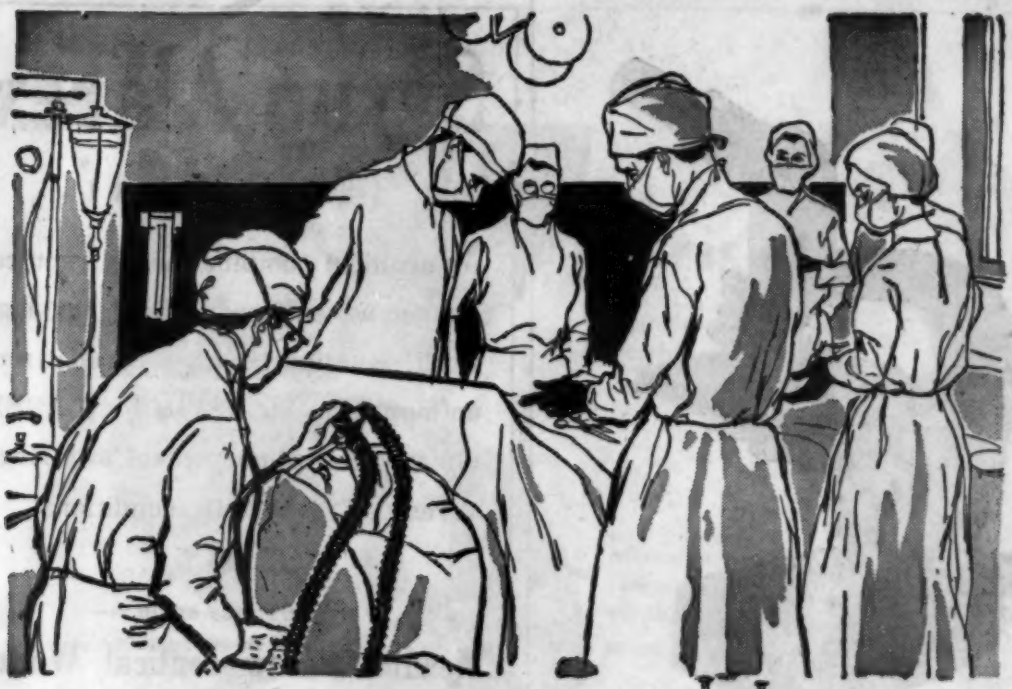
Dr. R. K. Choudhary

Dr. Ram Krishna Choudhary was born at Ranchi on April 22, 1931. He passed the Matriculation Examination from the local Zilla School and after a few months' study at the local St. Xavier's College joined the medical school at Bankura at the age of 16. He came out successful from that School in 1951. After his term as a house surgeon in Bankura, he joined the Degree Course at R. G. Kar Medical College, Calcutta and graduated in 1955.

He worked as Hony. House Surgeon for two years at the Ranchi Sadar Hospital. For about 10 months, he also served the Health Department of the State at Gumla with great credit and later joined the Maha Devi Birla T.B. Sanatorium at Tatisilway, Ranchi.

He subsequently joined a post as Grade I Medical Officer in the N.C.D.C. and was posted at Sayal Colliery about 4 miles from Bhurkunda Colliery. Within a short time he became very popular among all classes of people. While coming from Sayal to Ranchi on 21-4-1961 by a zeep he was involved in a serious motor accident and expired instantaneously, at a time when he was at the height of his fame.

In his death, Ranchi has lost a very promising young man and the profession, an ideal physician. The whole of Ranchi and Sayal mourned his sad and sudden demise. The loss to his family is great and irreparable but the loss to the general public is no less.



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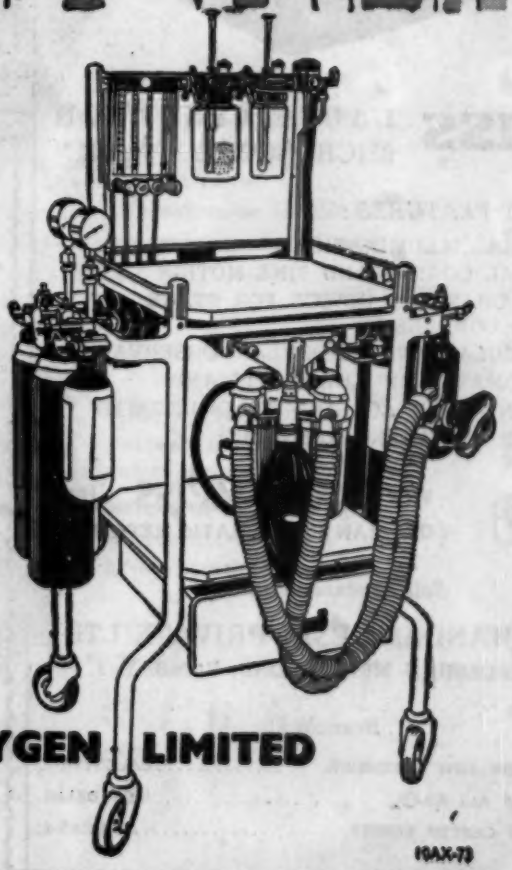

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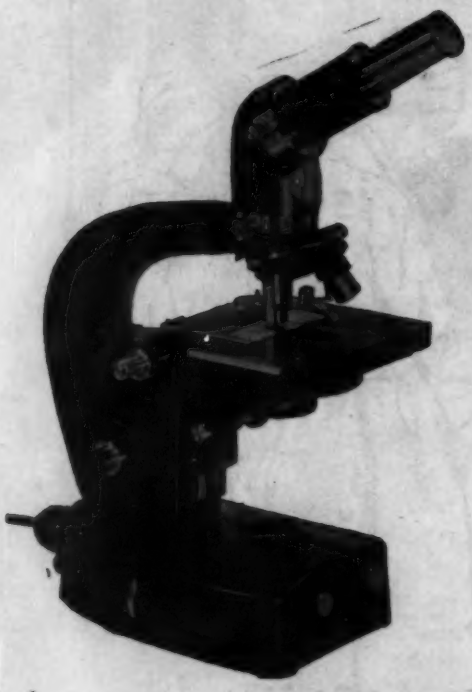

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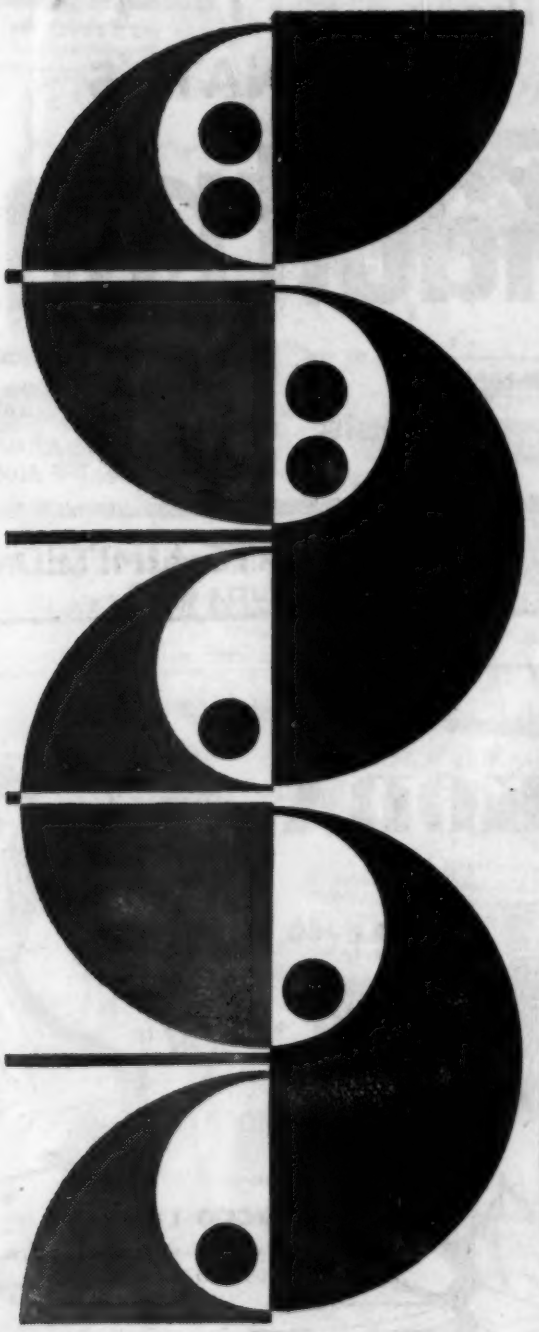

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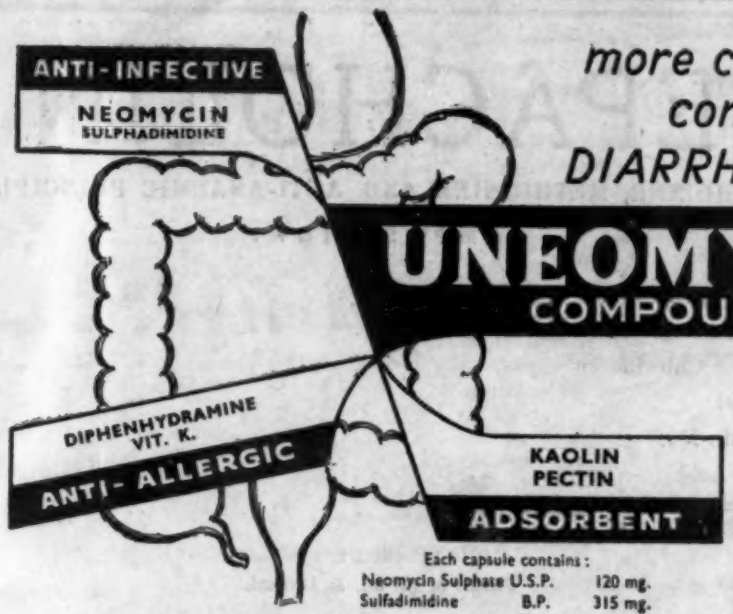

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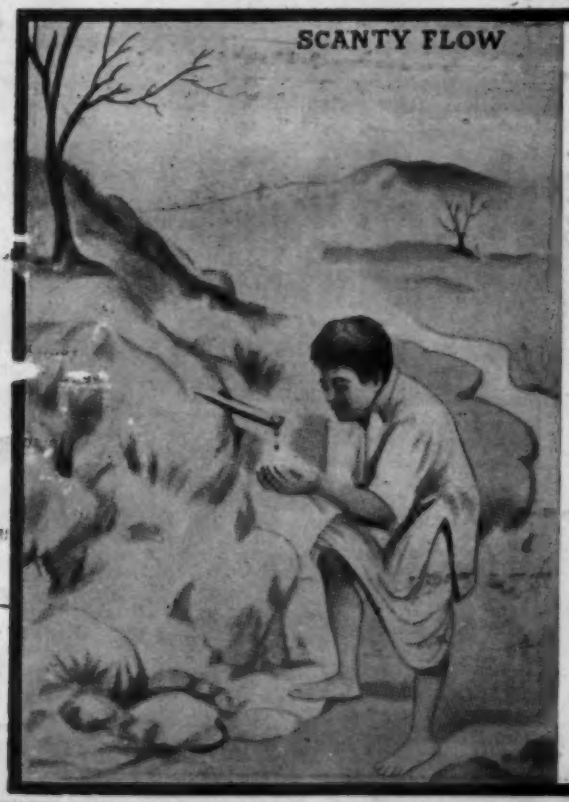

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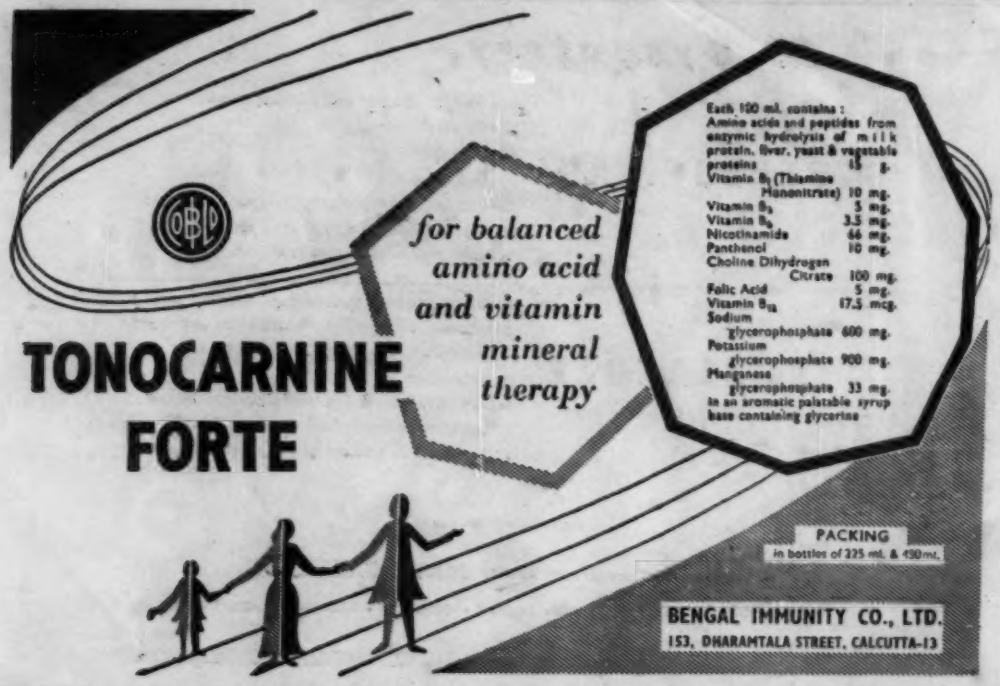
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